APPENDIX A

FIGS. A1, A2 and A3 show possible implementations for the low-pass filter (L_P) and the high-pass filter (H_P) cut-off filters. The order of these particular filters is kept small to support a low-MIPS implementation. FIG. A4 shows a possible implementation for the high and low shelving equalizers. These equalizers are used for L_S and H_S. FIG. A5 shows a parametric equalizer implementation usable for boost or cut applications. Combinations of such equalizers can be combined, as shown in FIGS. A6 and A7, to build the compensated notch effect.

APPENDIX B

Figure B1 is a block diagram of a compensation system used to compensate a small bookshelf speaker having a 5-inch bass driver and 3-inch tweeter. The speaker is characterized as follows:

Woofer: dome = 4.33 k (notch with LC)
cone = 4.9 k (compensated notch only)
edge of cone = 2.8 k (active notch)

Tweeter: dome = 15.1 k (no compensation)
cone cr = 11.6 k (active notch)
cone cr = 9.32 k / 9.45 k (damp compound)
W_0 = 1.38 k (LCR notch)

Fourteen adjustments are provided. FIG. B2 shows circuits used to create L_X, H_X, L_S, H_S, L_P, and H_P filters and parameters adjustments. A lower frequency cutoff peak was added to create response character of an 8 inch bookshelf system. For this circuit, Q and peaking amplitude are set by the components marked by square boxes. FIGS. B3 and B4 show W_0 notch sections and representative tuning for the speaker. W_0... and |A| in dB are adjustable, while a resistor set Q. Two groups of these make four adjustments. FIG. B5 shows a single low-Q boost. Adjustments for boost and frequency are provided by the op amp section. FIG. B6 is an all-pass equalizer used for time correction. The all-pass equalizer combines outputs from the six active process circuits.

APPENDIX C

A computer adjusted DSP compensator was implemented using a standard PC and a Motorola EVM56362 DSP evaluation board. Source code and application notes follow.

Speaker Tuning Application Note

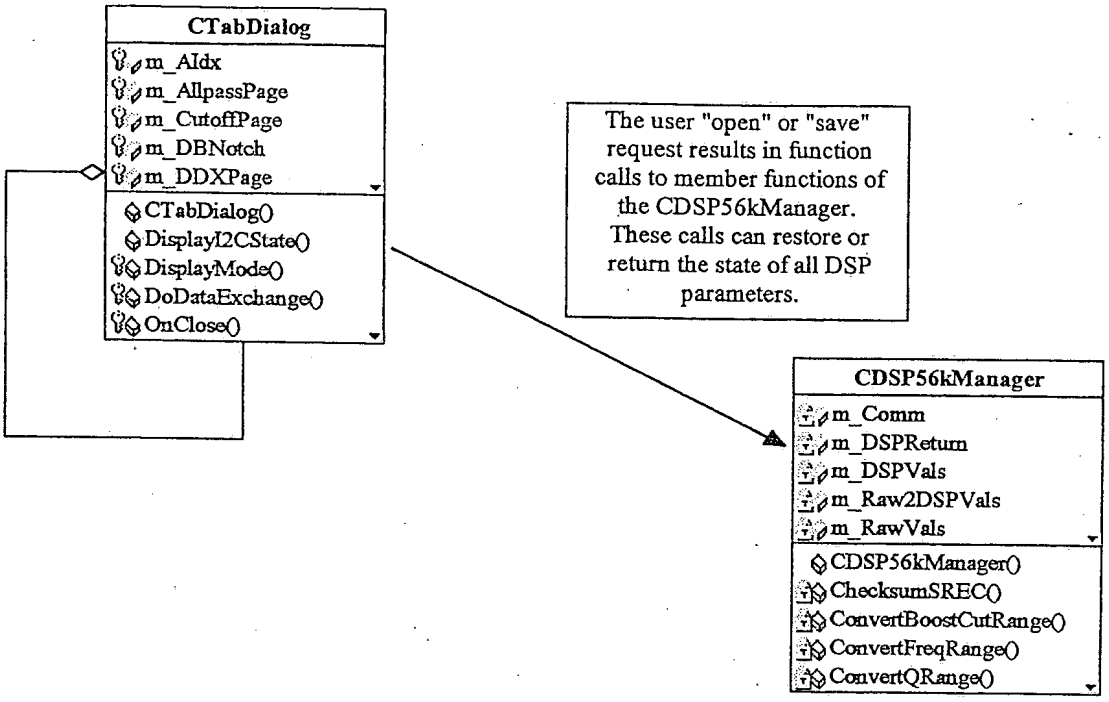
The speaker tuning application is written as a Windows OS 32-bit application using the object-oriented MFC application framework (please refer to the documentation of MFC that is included with Microsoft Visual C++ development environment). The application has a dialog interface. The main dialog class, CTabDialog, is a subclass of the MFC CDialog class. The CTabDialog class implements a "tabbed" dialog interface. Each tab in the dialog is a subclass of the MFC CPropertyPage class. Each tab represents different aspects of the speaker correction algorithm. The following is a list of tab classes:

- CMainPage which implements UI for pre and post volume controls amongst other things
- CShelvPage which implements UI controls for low and high shelving equalization filters
- CCutoffPage which implements UI controls for low and high peaking cutoff filters
- CNotchPage1 and CNotchPage2 which implements UI controls for a number of notch filters (to for example limit resonance in the speaker)
- CStWaveRejectPage which implements UI controls for a set of filters which can limit standing waves in the speaker cabinet
- CDBNotch which implements UI controls for a double-tuned notch filter
- CAllpassPage which implements UI for a 2^{nd}-order allpass filter

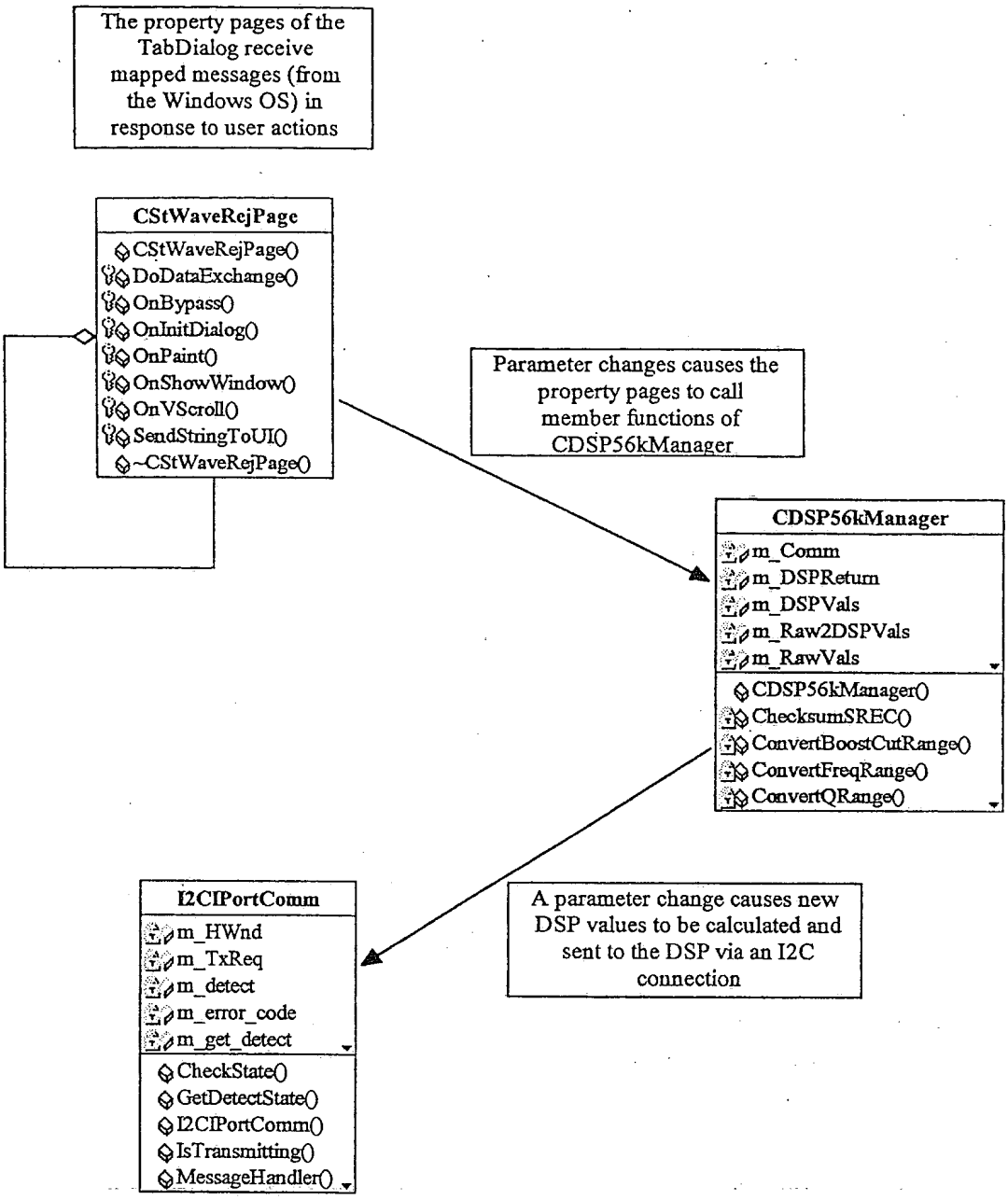
Each adjustable parameter on a tab page is represented by an instance of the CSlider class. Each UI slider has a range of 4096 discrete values. When a user manipulates a UI slider a message is sent from the tab page to an instance of the CDSP56Manager class. In this class, the appropriate calculation takes place to transform the linear input value into one or more values necessary to compute the transfer function represented by the user settings. These computed values are transmitted to the DSP using an I2C serial connection. The DSP executes the calculations necessary for the real-time implementation of the above-mentioned transfer function. The DSP is capable of computing a series of filter calculations in real-time to allow the total cascaded transfer function of all the speaker correction filters to be realized. The DSP can receive analog or digital input data and transmit processed analog or digital output data.

Speaker P[redacted]meter File Input and Outp[redacted]Logic

The tab dialog object instance receives messages (from the Windows OS) in response to user action in the application menus



Example of [redacted]roperty Page UI to DSP co[redacted]ection logic



```
// COMPortChooser.cpp : [redacted]ementation file
//

#include "stdafx.h"
#include "sa.h"
#include "COMPortChooser.h"

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CCOMPortChooser dialog


CCOMPortChooser::CCOMPortChooser(CWnd* pParent /*=NULL*/)
  : CDialog(CCOMPortChooser::IDD, pParent)
{
  //{{AFX_DATA_INIT(CCOMPortChooser)
    // NOTE: the ClassWizard will add member initialization here
  //}}AFX_DATA_INIT
}


void CCOMPortChooser::DoDataExchange(CDataExchange* pDX)
{
  CDialog::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CCOMPortChooser)
    // NOTE: the ClassWizard will add DDX and DDV calls here
  //}}AFX_DATA_MAP
}


BEGIN_MESSAGE_MAP(CCOMPortChooser, CDialog)
  //{{AFX_MSG_MAP(CCOMPortChooser)
  ON_BN_CLICKED(IDC_RADIO1, OnRadio1)
  ON_BN_CLICKED(IDC_RADIO2, OnRadio2)
  ON_BN_CLICKED(IDC_RADIO3, OnRadio3)
  ON_BN_CLICKED(IDC_RADIO4, OnRadio4)
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CCOMPortChooser message handlers

void CCOMPortChooser::OnRadio1()
{
  // TODO: Add your control notification handler code here
  which_port = 1;
}

void CCOMPortChooser::OnRadio2()
{
  // TODO: Add your control notification handler code here
  which_port = 2;

}

void CCOMPortChooser::OnRadio3()
{
  // TODO: Add your control notification handler code here
  which_port = 3;

}

void CCOMPortChooser::OnRadio4()
{
  // TODO: Add your control notification handler code here
  which_port = 4;
```

```
}

BOOL CCOMPortChooser::OnInitDialog()
{
  CDialog::OnInitDialog();

  // TODO: Add extra initialization here
  which_port = 3;

  return TRUE;  // return TRUE unless you set the focus to a control
                // EXCEPTION: OCX Property Pages should return FALSE
}
```

```
// CutoffPage.cpp : implementation file
//

#include "stdafx.h"
#include "sa.h"
#include "CutoffPage.h"
#include "DSP56kManager.h"

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CCutoffPage property page

IMPLEMENT_DYNCREATE(CCutoffPage, CPropertyPage)

CCutoffPage::CCutoffPage() : CPropertyPage(CCutoffPage::IDD)
{
  //{{AFX_DATA_INIT(CCutoffPage)
  //}}AFX_DATA_INIT
}

CCutoffPage::~CCutoffPage()
{
}

void CCutoffPage::DoDataExchange(CDataExchange* pDX)
{
  CPropertyPage::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CCutoffPage)
  DDX_Control(pDX, IDC_CHECK6, m_BypassSecondButton);
  DDX_Control(pDX, IDC_CHECK5, m_BypassFirstButton);
  DDX_Control(pDX, IDC_SLIDER6, m_HiBoostSlider);
  DDX_Control(pDX, IDC_SLIDER5, m_HiQSlider);
  DDX_Control(pDX, IDC_SLIDER4, m_HiFreqSlider);
  DDX_Control(pDX, IDC_SLIDER3, m_LoBoostSlider);
  DDX_Control(pDX, IDC_SLIDER2, m_LoQSlider);
  DDX_Control(pDX, IDC_SLIDER1, m_LoFreqSlider);
  //}}AFX_DATA_MAP
}


BEGIN_MESSAGE_MAP(CCutoffPage, CPropertyPage)
  //{{AFX_MSG_MAP(CCutoffPage)
  ON_WM_VSCROLL()
  ON_BN_CLICKED(IDC_CHECK5, OnBypassFirst)
  ON_BN_CLICKED(IDC_CHECK6, OnBypassSecond)
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CCutoffPage message handlers

BOOL CCutoffPage::OnInitDialog()
{
  CPropertyPage::OnInitDialog();

  // TODO: Add extra initialization here
  m_LoFreqSlider.SetRange(0,CONTROL_RANGE);
  m_LoFreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch6Freq));
  m_LoFreqSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_LoQSlider.SetRange(0,CONTROL_RANGE);
  m_LoQSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch6Q));
  m_LoQSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_LoBoostSlider.SetRange(0,CONTROL_RANGE);
  m_LoBoostSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch6Boost));
  m_LoBoostSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_HiFreqSlider.SetRange(0,CONTROL_RANGE);
  m_HiFreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch7Freq));
```

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```
  m_HiFreqSlider.SetTicF[redacted](CONTROL_RANGE+1)/16);
  m_HiQSlider.SetRange(0,CONTROL_RANGE);
  m_HiQSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch7Q));
  m_HiQSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_HiBoostSlider.SetRange(0,CONTROL_RANGE);
  m_HiBoostSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch7Boost));
  m_HiBoostSlider.SetTicFreq((CONTROL_RANGE+1)/16);

//  g_DSPManager->SetCutoff1Freq(CONTROL_RANGE-m_LoFreqSlider.GetPos());
//  g_DSPManager->SetCutoff1Q(CONTROL_RANGE-m_LoQSlider.GetPos());
//  g_DSPManager->SetCutoff1Boost(CONTROL_RANGE-m_LoBoostSlider.GetPos());
//  g_DSPManager->SetCutoff2Freq(CONTROL_RANGE-m_HiFreqSlider.GetPos());
//  g_DSPManager->SetCutoff2Q(CONTROL_RANGE-m_HiQSlider.GetPos());
//  g_DSPManager->SetCutoff2Boost(CONTROL_RANGE-m_HiBoostSlider.GetPos());


  return TRUE;  // return TRUE unless you set the focus to a control
                // EXCEPTION: OCX Property Pages should return FALSE
}

void CCutoffPage::OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar)
{
  // TODO: Add your message handler code here and/or call default

  CPropertyPage::OnVScroll(nSBCode, nPos, pScrollBar);

  Sleep(50);
  if( (CSliderCtrl *)pScrollBar == &m_LoFreqSlider )
    g_DSPManager->SetCutoff1Freq(CONTROL_RANGE-m_LoFreqSlider.GetPos());
  else if( (CSliderCtrl *)pScrollBar == &m_LoQSlider )
    g_DSPManager->SetCutoff1Q(CONTROL_RANGE-m_LoQSlider.GetPos());
  else if( (CSliderCtrl *)pScrollBar == &m_LoBoostSlider )
    g_DSPManager->SetCutoff1Boost(CONTROL_RANGE-m_LoBoostSlider.GetPos());
  else if( (CSliderCtrl *)pScrollBar == &m_HiFreqSlider )
    g_DSPManager->SetCutoff2Freq(CONTROL_RANGE-m_HiFreqSlider.GetPos());
  else if( (CSliderCtrl *)pScrollBar == &m_HiQSlider )
    g_DSPManager->SetCutoff2Q(CONTROL_RANGE-m_HiQSlider.GetPos());
  else if( (CSliderCtrl *)pScrollBar == &m_HiBoostSlider )
    g_DSPManager->SetCutoff2Boost(CONTROL_RANGE-m_HiBoostSlider.GetPos());

}

void CCutoffPage::OnBypassFirst()
{
  // TODO: Add your control notification handler code here
  int state = m_BypassFirstButton.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassHipass);

}

void CCutoffPage::OnBypassSecond()
{
  // TODO: Add your control notification handler code here
  int state = m_BypassSecondButton.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassLopass);

}
```

```
#if !defined(AFX_COMPOR[redacted]SER_H__B5D510E7_F7D5_11D2_96EE_00609[redacted]E2__INCLUDED_)
#define AFX_COMPORTCHOOSER_H__B5D510E7_F7D5_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000
// COMPortChooser.h : header file
//

/////////////////////////////////////////////////////////////////////////////
// CCOMPortChooser dialog

class CCOMPortChooser : public CDialog
{

// Construction
public:
  CCOMPortChooser(CWnd* pParent = NULL);   // standard constructor

  int which_port;

// Dialog Data
  //{{AFX_DATA(CCOMPortChooser)
  enum { IDD = IDD_DIALOG3 };
    // NOTE: the ClassWizard will add data members here
  //}}AFX_DATA


// Overrides
  // ClassWizard generated virtual function overrides
  //{{AFX_VIRTUAL(CCOMPortChooser)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:

  // Generated message map functions
  //{{AFX_MSG(CCOMPortChooser)
  afx_msg void OnRadio1();
  afx_msg void OnRadio2();
  afx_msg void OnRadio3();
  afx_msg void OnRadio4();
  virtual BOOL OnInitDialog();
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()
};

//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_COMPORTCHOOSER_H__B5D510E7_F7D5_11D2_96EE_006097CDB9E2__INCLUDED_)
```

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```
#if !defined(AFX_CUTOFF[redacted]_H__6F151625_D84D_11D2_96EE_006097CDB[redacted]_INCLUDED_)
#define AFX_CUTOFFPAGE_H__6F151625_D84D_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000
// CutoffPage.h : header file
//

/////////////////////////////////////////////////////////////////////////////
// CCutoffPage dialog

class CCutoffPage : public CPropertyPage
{
  DECLARE_DYNCREATE(CCutoffPage)

// Construction
public:
  CCutoffPage();
  -CCutoffPage();

// Dialog Data
  //{{AFX_DATA(CCutoffPage)
  enum { IDD = IDD_PP7 };
  CButton m_BypassSecondButton;
  CButton m_BypassFirstButton;
  CSliderCtrl m_HiBoostSlider;
  CSliderCtrl m_HiQSlider;
  CSliderCtrl m_HiFreqSlider;
  CSliderCtrl m_LoBoostSlider;
  CSliderCtrl m_LoQSlider;
  CSliderCtrl m_LoFreqSlider;
  //}}AFX_DATA


// Overrides
  // ClassWizard generate virtual function overrides
  //{{AFX_VIRTUAL(CCutoffPage)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:
  // Generated message map functions
  //{{AFX_MSG(CCutoffPage)
  virtual BOOL OnInitDialog();
  afx_msg void OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar);
  afx_msg void OnBypassFirst();
  afx_msg void OnBypassSecond();
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()

};

//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_CUTOFFPAGE_H__6F151625_D84D_11D2_96EE_006097CDB9E2__INCLUDED_)
```

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```
#if !defined(AFX_ALLPAS[redacted]E_H__F4767B24_11B3_11D3_96EE_006097CD[redacted]__INCLUDED_)
#define AFX_ALLPASSPAGE_H__F4767B24_11B3_11D3_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000
// AllpassPage.h : header file
//

/////////////////////////////////////////////////////////////////////////////
// CAllpassPage dialog

class CTabDialog;

class CAllpassPage : public CPropertyPage
{
  DECLARE_DYNCREATE(CAllpassPage)

// Construction
public:
  CAllpassPage();
  ~CAllpassPage();

// Dialog Data
  //{{AFX_DATA(CAllpassPage)
  enum { IDD = IDD_PP10 };
  CButton m_BypassButton;
  CSliderCtrl m_QSlider;
  CSliderCtrl m_FrequencySlider;
  //}}AFX_DATA


// Overrides
  // ClassWizard generate virtual function overrides
  //{{AFX_VIRTUAL(CAllpassPage)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:
  // Generated message map functions
  //{{AFX_MSG(CAllpassPage)
  afx_msg void OnBypass();
  virtual BOOL OnInitDialog();
  afx_msg void OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar);
  afx_msg void OnPaint();
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()

  CTabDialog *m_ParentWindow;
  void SendStringToUI(int which);

};

//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_ALLPASSPAGE_H__F4767B24_11B3_11D3_96EE_006097CDB9E2__INCLUDED_)
```

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```
// AllpassPage.cpp : implementation file
//

#include "stdafx.h"
#include "sa.h"
#include "AllpassPage.h"
#include "TabDialog.h"
#include "DSP56kManager.h"

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CAllpassPage property page

IMPLEMENT_DYNCREATE(CAllpassPage, CPropertyPage)

CAllpassPage::CAllpassPage() : CPropertyPage(CAllpassPage::IDD)
{
  //{{AFX_DATA_INIT(CAllpassPage)
  //}}AFX_DATA_INIT
}

CAllpassPage::~CAllpassPage()
{
}

void CAllpassPage::DoDataExchange(CDataExchange* pDX)
{
  CPropertyPage::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CAllpassPage)
  DDX_Control(pDX, IDC_CHECK1, m_BypassButton);
  DDX_Control(pDX, IDC_SLIDER3, m_QSlider);
  DDX_Control(pDX, IDC_SLIDER1, m_FrequencySlider);
  //}}AFX_DATA_MAP
}


BEGIN_MESSAGE_MAP(CAllpassPage, CPropertyPage)
  //{{AFX_MSG_MAP(CAllpassPage)
  ON_BN_CLICKED(IDC_CHECK1, OnBypass)
  ON_WM_VSCROLL()
  ON_WM_PAINT()
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CAllpassPage message handlers

void CAllpassPage::OnBypass()
{
  // TODO: Add your control notification handler code here
  int state = m_BypassButton.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassAllpass);

}

BOOL CAllpassPage::OnInitDialog()
{
  CPropertyPage::OnInitDialog();

  // TODO: Add extra initialization here
  m_FrequencySlider.SetRange(0,CONTROL_RANGE);
  m_FrequencySlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kAllpassFreq));
  m_FrequencySlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_QSlider.SetRange(0,CONTROL_RANGE);
  m_QSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kAllpassQ));
  m_QSlider.SetTicFreq((CONTROL_RANGE+1)/16);
```

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```
  m_ParentWindow = (CTabDialog *) GetParent()->GetParent();

  return TRUE;  // return TRUE unless you set the focus to a control
                // EXCEPTION: OCX Property Pages should return FALSE
}

void CAllpassPage::OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar)
{
  // TODO: Add your message handler code here and/or call default
  CSliderCtrl *slider = (CSliderCtrl *)pScrollBar;
  int which;

  CPropertyPage::OnVScroll(nSBCode, nPos, pScrollBar);

  Sleep(50);
  if( slider == &m_FrequencySlider )
    which = kAllpassFreq;
  else if( slider == &m_QSlider )
    which = kAllpassQ;
  else
    return;

  g_DSPManager->SetParamValue(CONTROL_RANGE-slider->GetPos(),which);
  SendStringToUI(which);

}

void CAllpassPage::SendStringToUI(int which)
{

    CString str;

    g_DSPManager->GetStringValue(which,str);
    m_ParentWindow->SetStatusString(0,str);

}


void CAllpassPage::OnPaint()
{
  CPaintDC dc(this); // device context for painting

  // TODO: Add your message handler code here
  m_FrequencySlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kAllpassFreq));
  m_QSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kAllpassQ));
  m_BypassButton.SetCheck(g_DSPManager->GetBypassSection(kBypassAllpass));

  // Do not call CPropertyPage::OnPaint() for painting messages
}
```

```
// DSPComm.h: interface for the DSPComm class.
//
//////////////////////////////////////////////////////////////////////

#if !defined(AFX_DSPCOMM_H__33F9EF05_F6EF_11D2_96EE_006097CDB9E2__INCLUDED_)
#define AFX_DSPCOMM_H__33F9EF05_F6EF_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000

class DSPComm
{
public:
  virtual BOOL IsTransmitting();
  virtual long GetDetectState(void);
  virtual BOOL CheckState(void);
  virtual long SendDSPMemory(char *, long);
  virtual long SendDSPWord(long);
  DSPComm();
  virtual ~DSPComm();

};

#endif // !defined(AFX_DSPCOMM_H__33F9EF05_F6EF_11D2_96EE_006097CDB9E2__INCLUDED_)
```

```
// DSPComm.cpp: implementation of the DSPComm class.
//
//////////////////////////////////////////////////////////////////////

#include "stdafx.h"
#include "sa.h"
#include "DSPComm.h"

#ifdef _DEBUG
#undef THIS_FILE
static char THIS_FILE[]=__FILE__;
#define new DEBUG_NEW
#endif

//////////////////////////////////////////////////////////////////////
// Construction/Destruction
//////////////////////////////////////////////////////////////////////

DSPComm::DSPComm()
{

}

DSPComm::~DSPComm()
{

}

long DSPComm::SendDSPWord(long)
{

  return( 0L );
}

long DSPComm::SendDSPMemory(char *data, long len)
{

  return( 0L );
}

BOOL DSPComm::CheckState()
{
  return( true );
}

long DSPComm::GetDetectState()
{

  return( 0L );

}

BOOL DSPComm::IsTransmitting()
{

  return( false );

}
```

```
// DSP56kManager.h: interface for the CDSP56kManager class.
//
//////////////////////////////////////////////////////////////////////

#if !defined(AFX_DSP56KMANAGER_H__0CF7E204_D790_11D2_96EE_006097CDB9E2__INCLUDED_)
#define AFX_DSP56KMANAGER_H__0CF7E204_D790_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000

#include "DSP56Equates.h"
#include "DSPComm.h"

#define CONTROL_RANGE_L2  12
#define CONTROL_RANGE     ((1L<<CONTROL_RANGE_L2)-1)
#define PG_CONTROL_AMT  (CONTROL_RANGE/64)
#define CONTROL_RANGE_SC  (23-CONTROL_RANGE_L2)
#define DSP_CONTROL_MAX 8388608.

class CDSP56kManager
{

  long  m_DSPReturn;
  long  m_Raw2DSPVals[kUIArraySize];
  long  m_RawVals[kUIArraySize];
  long  m_DSPVals[kDSPArraySize];
  double m_pi;
  DSPComm *m_Comm;

public:
  void GetPureStringValue(int which, CString &str);
  void GetFilterBlob(CStringArray &array);
  virtual BOOL GetBypassSection(int which);
  virtual void SetBypassSection(BOOL value, int which);
  virtual BOOL IsBusy();
  virtual void GetStringValue(int which,CString &str);
  virtual BOOL IsReady(void);
  virtual void SetAnalogInput(long);
  virtual int GetHDCDMode(void);
  virtual void ResetAll(void);
  virtual void SetHDCDGainScale(long);
  virtual void SetHDCDBypass(long);
  virtual void SetDDXCompBypass(long);
  virtual void SetBypass(long value);
  virtual void GetDSPSettings(CStringArray &array);
  virtual void SetDSPSettings(CStringArray &array);
  virtual void SetParamValue(long value, long which);
  virtual long GetParamValue(long which);
  void DownloadDSPCode(void);

  CDSP56kManager(HWND p);
  virtual ~CDSP56kManager();

private:
  void SetNotchQ(long value,long which,long freqwhich);
  void SetNotchFreq(long value,long which);
  void SetShelvFreq(long value,long which);
  void SetBoostCut(long value,long which);
  void SetRawValue(long value, long which);
  double DoConvertFreqRange(double in,double top,double bottom);
  double ConvertFreqRange(int which);
  double ConvertQRange(long val);
  double ConvertBoostCutRange(long val);
  virtual void SendDSPValue(long which);

  int ChecksumSREC(char *lineptr,int N);
  void GetSRecordAddressRange(char *s, long *start, long *end, char **data);

protected:
  virtual void SetDelay(long value);
  void SetLoCutoff(void);
```

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```
  void SetHiCutoff(void);
  void SetHiCutoff2(void);

  virtual void SetHiCutoff2Q(long value);
  virtual void SetHiCutoff2Freq(long value);
  virtual void SetHiCutoffQ(long value);
  virtual void SetHiCutoffFreq(long value);
  virtual void SetLoCutoffQ(long value);
  virtual void SetLoCutoffFreq(long value);
  virtual void SetPreVolume(long value);
  virtual void SetAnalogVolume(long value);

//  virtual void SetCutoff1Freq(long value);
//  virtual void SetCutoff1Q(long value);
//  virtual void SetCutoff1Boost(long value);
//  virtual void SetCutoff2Freq(long value);
//  virtual void SetCutoff2Q(long value);
//  virtual void SetCutoff2Boost(long value);
  virtual void SetShelv1Freq(long value);
  virtual void SetShelv1Boost(long value);
  virtual void SetShelv2Freq(long value);
  virtual void SetShelv2Boost(long value);
  virtual void SetNotch1Cut(long value);
  virtual void SetNotch1Q(long value);
  virtual void SetNotch1Freq(long value);
  virtual void SetNotch2Cut(long value);
  virtual void SetNotch2Q(long value);
  virtual void SetNotch2Freq(long value);
  virtual void SetNotch3Cut(long value);
  virtual void SetNotch3Q(long value);
  virtual void SetNotch3Freq(long value);
  virtual void SetNotch4Cut(long value);
  virtual void SetNotch4Q(long value);
  virtual void SetNotch4Freq(long value);
  virtual void SetNotch5Q(long value);
  virtual void SetNotch5Boost(long value);
  virtual void SetNotch6Cut(long value);
  virtual void SetNotch6Q(long value);
  virtual void SetNotch6Freq(long value);
  virtual void SetNotch7Cut(long value);
  virtual void SetNotch7Q(long value);
  virtual void SetNotch7Freq(long value);
  virtual void SetNotch9Freq(long value);

  virtual void SetMainVolume(long value);


};

extern  CDSP56kManager *g_DSPManager;

#endif // !defined(AFX_DSP56KMANAGER_H__0CF7E204_D790_11D2_96EE_006097CDB9E2__INCLUDED_)
```

0017 A

```
// DSP56kManager.cpp: implementation of the CDSP56kManager class.
//
//////////////////////////////////////////////////////////////////////

#include "stdafx.h"
#include "sa.h"
#include "DSP56kManager.h"
#include <math.h>
#include <stdlib.h>
#include <stdio.h>
#include <string.h>

#if 0
#include "unit_ppi.h"
#include "functs.h"
#endif

#ifdef  SPI
#include "SPIPEMicroComm.h"
#endif
#include "I2CIPortComm.h"


#include "sapmem.h"
#include "SSTParams.h"

#ifdef _DEBUG
#undef THIS_FILE
static char THIS_FILE[]=__FILE__;
#define new DEBUG_NEW
#endif

#if 0
static    int cmd_delay = 1000;
static    int io_delay = 50;
#endif

#define FILE_VERSION  2     // file version
#define GAIN_SCALE 8.

// volume
#define VOLTOP  1.
#define VOLBOT  3.909e-6
#define VOLRANGE  (VOLTOP-VOLBOT)

// hi and lo cutoff and shelving ranges
#define FLCTOPRANGE 0.149           // 1000/22050
#define FLCBOTRANGE 0.001769        // 10/22050
#define FLCRANGE (FLCTOPRANGE-FLCBOTRANGE)

#define FLCTOPRANGE2  4.255           // 2000
#define FLCBOTRANGE2  2.134           // 15

#define FHCTOPRANGE 1            // 22050/22050
#define FHCBOTRANGE 0.63         // 8000/22050
#define FHCBOTRANGE2  0.42       // 4000/22050
#define FHCRANGE (FHCTOPRANGE-FHCBOTRANGE)
#define FHCRANGE2 (FHCTOPRANGE-FHCBOTRANGE2)

#define QLCTOPRANGE 1.0             // 1
#define QLCBOTRANGE 0.003891        // 0.001
#define QLCRANGE (QLCTOPRANGE-(QLCBOTRANGE))

#define SAMPLING_FREQ     44100
#define DELAY_LENGTH      128.

// converts frequency range to log scale
#define FTOPRANGE 1.
#define FBOTRANGE 0.134
#define FRANGE (FTOPRANGE-FBOTRANGE)
#define FTOPRANGE2 0.585    // about 2205 top.
#define FBOTRANGE2  3.531E-3
```

```
// new ranges using act[redacted]requencies
#define FTOPRANGE3  4.431   // 3000 Hz
#define FBOTRANGE3  2.433   // 30 Hz

// hi cutoff filter ranges
#define QHC2BOT   0.74
#define QHC2TOP   2.258
#define FHC2BOT   3.954   // 1000 Hz
#define FHC2TOP   5.255   // 20 kHz

#define FHCTOPRANGE3  5.13            // 15000
#define FHCBOTRANGE3  FHC2BOT


static char *m_ParamNames[kUIArraySize] = { "MainVolume",
    "LoShelfFreq",
    "LoShelfGain",
    "HiShelfFreq",
    "HiShelfGain",
    "Notch1Freq",
    "Notch1Q",
    "Notch1Cut",
    "Notch2Freq",
    "Notch2Q",
    "Notch2Cut",
    "Notch3Freq",
    "Notch3Q",
    "Notch3Cut",
    "Notch4Freq",
    "Notch4Q",
    "Notch4Cut",
    "Notch5Freq",
    "Notch5Q",
    "Notch5Cut",
    "PreVolume",
    "Bypass",
    "LoCutoffFreq",
    "LoCutoffQ",
    "HiCutoffFreq",
    "HiCutoffQ",
    "HDCDBypass",
    "HDCDGainScaleOff",
    "DDXCompBypass",
    "Notch6Freq",
    "Notch6Q",
    "Notch6Cut",
    "Notch7Freq",
    "Notch7Q",
    "Notch7Cut",
    "AnalogIn",
    "AnalogVolume",
    "Delay",
    "AllpassFreq",
    "AllpassQ",
    "BypassMask",
    "HiCutoff2Freq",
    "HiCutoff2Q",
    "Notch8Freq",
    "Notch8Q",
    "Notch8Cut",
    "Notch9Freq",
    "Notch9Q",
    "Notch9Cut",
    "NotchAFreq",
    "NotchAQ",
    "NotchACut",
    "DBNotchWidth" };

//////////////////////////////////////////////////////////////////////////
// SREC code
//////////////////////////////////////////////////////////////////////////
```

0018

```
int CDSP56kManager::ChecksumSREC(char *lineptr,int N)
{

  unsigned char curbyte,sum=0xff;
  for (int x=2;x<N-2;x+=2)
  {
    sscanf(lineptr+x,"%2x",&curbyte);
    sum-=curbyte;
  }

  // last one is checksum
  sscanf(lineptr+x,"%2x",&curbyte);
  return (curbyte==sum);

}

void CDSP56kManager::GetSRecordAddressRange(char *s, long *start, long *end, char **data)
{

  long address,count,soffset;

  *start = -1L;
  *end = -1L;

  if (*s != 'S') // not a srec
        return;

  // Let's check the checksum for this line
  ASSERT ( ChecksumSREC(s,strlen(s)) );
  switch( s[1] )
    {
  case '1':
        soffset=8;
        sscanf(&(s[4]),"%4x",&address);
        break;
  case '2':
        soffset=10;
        sscanf(&(s[4]),"%6x",&address);
        break;
  case '3':
        soffset=12;
        sscanf(&(s[4]),"%8x",&address);
        break;
  default:
    return;
    break;

    }

  count = strlen(s) - soffset - 2;
  *start = address;
  *end = address + (count/6);      // each word is 6 characters
  *data = s + soffset;

}


void CDSP56kManager::DownloadDSPCode()
{

    char **r = pmem;
    int count = PRECORDS;
    long start,end;
    long ts,te;
    char **recs;
    char *srecdata,*td;
    char *data,*dptr,*rdata,c;

    long size,bsize;
    long taddress,recstart,recend;
    long value;
```

```
// get starting and ending addresses
start  = 0x7FFFFFFFL;
end = 0;
recs = r;
for( int i = 0; i < count ; i++ )
{
  GetSRecordAddressRange(*recs++,&ts,&te,&srecdata);
  if( ts < 0L ) continue;
  start = min(start,ts);
  end = max(end,te);
}

size = end - start;
bsize = size * 3;
rdata = (char *) malloc(bsize+6);      // 3 bytes per word plus length and address
ASSERT( data != NULL );
data = rdata + 6;

dptr = data;
for( i = 0 ; i < bsize ; i++ )     // clear memory
  *dptr++ = 0;
taddress = start;
while( taddress < end )
{
  recstart = 0x7FFFFFFFL;
  recs = r;
  for( int i = 0; i < count ; i++ )            // search for next address
  {
    GetSRecordAddressRange(*recs,&ts,&te,&td);
    if( ts >= 0L )
    {
      if( ts >= taddress )
      {
        if( ts < recstart )
        {
          recstart = ts;
          recend = te;
          srecdata = td;
        }
      }
    }
    recs++;
  }
  ASSERT( recstart <= end );
  // copy record
  dptr = data + ((recstart - start)*3);
  while( recstart != recend )
  {
    sscanf(srecdata,"%2x",&value);
    *dptr++ = (char ) value;
    srecdata += 2;
    sscanf(srecdata,"%2x",&value);
    *dptr++ = (char ) value;
    srecdata += 2;
    sscanf(srecdata,"%2x",&value);
    *dptr++ = (char ) value;
    srecdata += 2;
    recstart++;
  }
  taddress = recend;
}

// copy size and address
dptr = rdata;
c = (size >> 16) & 0xFF;
*dptr++ = c;
c = (size >> 8) & 0xFF;
*dptr++ = c;
c = size & 0xFF;
*dptr++ = c;
c = (start >> 16) & 0xFF;
```

0020

```
        *dptr++ = c;
        c = (start >> 8) & 0xFF;
        *dptr++ = c;
        c = start & 0xFF;
        *dptr++ = c;

        // send data to DSP
        //m_Comm->SendDSPWord(size);
        //m_Comm->SendDSPWord(start);
        m_Comm->SendDSPMemory(rdata,bsize+6);

        free( rdata );

    }

    ////////////////////////////////////////////////////////////////////////
    // Construction/Destruction
    ////////////////////////////////////////////////////////////////////////

    CDSP56kManager::CDSP56kManager(HWND p)
    {

    #if 0
      if( load_dll()==false )
      {
        MessageBox(NULL,"UNIT_PPI not found in the system directory. Fix this and restart application.","Danger,
    anger Will Robinson", MB_OK | MB_ICONSTOP );
      }
      else
      {
        init_port_spi(1);
        set_cmd_delay_cnt_value(cmd_delay);
        set_io_delay_cnt_value(io_delay);
      }
    #endif
      m_pi = acos(-1.);

      m_Comm = new I2CIPortComm(p);

    //  DownloadDSPCode();


      int i;
      for( i = 0 ; i < kUIArraySize ; i++ )
      {
        m_Raw2DSPVals[i] = i;
      }

      m_Raw2DSPVals[kNotch6Freq] = kDSPNotch6Freq;
      m_Raw2DSPVals[kNotch6Q] = kDSPNotch6Q;
      m_Raw2DSPVals[kNotch6Cut] = kDSPNotch6Cut;
      m_Raw2DSPVals[kNotch7Freq] = kDSPNotch7Freq;
      m_Raw2DSPVals[kNotch7Q] = kDSPNotch7Q;
      m_Raw2DSPVals[kNotch7Cut] = kDSPNotch7Cut;
      m_Raw2DSPVals[kDelay] = kDSPDelay;
      m_Raw2DSPVals[kAllpassFreq] = kDSPAllpassFreq;
      m_Raw2DSPVals[kAllpassQ] = kDSPAllpassQ;

      m_Raw2DSPVals[kNotch8Freq] = kDSPNotch8Freq;
      m_Raw2DSPVals[kNotch8Q] = kDSPNotch8Q;
      m_Raw2DSPVals[kNotch8Cut] = kDSPNotch8Cut;
      m_Raw2DSPVals[kNotch9Freq] = kDSPNotch9Freq;
      m_Raw2DSPVals[kNotch9Q] = kDSPNotch9Q;
      m_Raw2DSPVals[kNotch9Cut] = kDSPNotch9Cut;
      m_Raw2DSPVals[kNotchAFreq] = kDSPNotchAFreq;
      m_Raw2DSPVals[kNotchAQ] = kDSPNotchAQ;
      m_Raw2DSPVals[kNotchACut] = kDSPNotchACut;

      ResetAll();

    }
```

0021

```
CDSP56kManager::~CDSP56kManager()
{

  if( m_Comm )
    delete m_Comm;

}

void CDSP56kManager::SetMainVolume(long value)
{

  double fvalue;

  if( value >= 0 )
    SetRawValue(value,kMainVolume);
  if( m_RawVals[kMainVolume] == DSP_CONTROL_MAX )
    m_DSPVals[kDSPMainVolume] = -m_RawVals[kMainVolume];
  else if( m_RawVals[kMainVolume] == 0 )
    m_DSPVals[kDSPMainVolume] = 0;
  else
    {
      fvalue = m_RawVals[kMainVolume];
      fvalue /= DSP_CONTROL_MAX;     // normalize
      fvalue *= VOLRANGE;
      fvalue += VOLBOT;
      fvalue = (pow(10.,fvalue) - 1.)/(10.-1.);
      fvalue *= DSP_CONTROL_MAX;
      m_DSPVals[kDSPMainVolume] = (long) -fvalue;
    }
  SendDSPValue(kDSPMainVolume);

}

void CDSP56kManager::SendDSPValue(long which)
{

  long value = m_DSPVals[which];

#if 0

  // transmitted value has parameter value in top 16 bits and parameter identifier in 8 LSBs
  value = (value & 0xFFFF00) | (which & 0xFF);
//  m_DSPReturn = spi_xchng24(value);
  m_DSPReturn = m_Comm->SendDSPWord(value);
#endif

  // changed protocol around to send index followed by data
  char  buffer[6];

  buffer[0] = (which >> 16) & 0xFF;
  buffer[1] = (which >> 8) & 0xFF;
  buffer[2] = which & 0xFF;
  buffer[3] = (value >> 16) & 0xFF;
  buffer[4] = (value >> 8) & 0xFF;
  buffer[5] = value & 0xFF;
  m_DSPReturn = m_Comm->SendDSPMemory(buffer,6);

}


void CDSP56kManager::SetNotchFreq(long ivalue,long which)
{

  double value;
  int dspindex = m_Raw2DSPVals[which];

  if( ivalue >= 0 )
    SetRawValue(ivalue,which);
  value = ConvertFreqRange(which);
  value = - cos(m_pi*value);
  value *= DSP_CONTROL_MAX;
  m_DSPVals[dspindex] = (long) value;
```

0022

```
    SendDSPValue(dspindex);
    SetNotchQ(-1L,which+1,which);

}

#ifdef  LEGACY
void CDSP56kManager::SetShelvFreq(long ivalue,long which)
{

  double value,wc;
  int dspindex = m_Raw2DSPVals[which];

  if( ivalue >= 0 )
    SetRawValue(ivalue,which);
  value = ConvertFreqRange(which);
  wc = m_pi*value;
  value = (tan(wc/2)-1)/(tan(wc/2)+1);
  value *= DSP_CONTROL_MAX;
  m_DSPVals[dspindex] = (long) value;
  SendDSPValue(dspindex);

}
#endif

void CDSP56kManager::SetNotchQ(long ivalue,long which,long rawfreq)
{

  double beta,tbeta,q,wc;
  int dspindex = m_Raw2DSPVals[which];

  if( ivalue >= 0 )
    SetRawValue(ivalue,which);
  wc = ConvertFreqRange(rawfreq);
  wc = m_pi*wc;
  q = ConvertQRange(m_RawVals[which]);
  tbeta = wc/(2*q);
  if( tbeta > m_pi/4 )
    tbeta = m_pi/4;
  beta = (1.-tan(tbeta))/(1.+tan(tbeta));
  beta *= DSP_CONTROL_MAX;
  m_DSPVals[dspindex] = (long) beta;
  SendDSPValue(dspindex);

}

void CDSP56kManager::SetBoostCut(long ivalue,long which)
{

  double value;
  int dspindex = m_Raw2DSPVals[which];

  if( ivalue >= 0 )
    SetRawValue(ivalue,which);
  value = ConvertBoostCutRange(m_RawVals[which]);
  value = pow(10.,value);
  value /= GAIN_SCALE;
  value *= DSP_CONTROL_MAX;
  m_DSPVals[dspindex] = (long) value;
  SendDSPValue(dspindex);

}

void CDSP56kManager::SetShelv1Freq(long ivalue)
{

//  SetShelvFreq(value,kLoShelfFreq);
  double value,wc;

  if( ivalue >= 0 )
    SetRawValue(ivalue,kLoShelfFreq);
  value = m_RawVals[kLoShelfFreq];
  value /= DSP_CONTROL_MAX;   // normalize
```

```
  value *= FLCRANGE;
  value += FLCBOTRANGE;
  value = (pow(10.,value) - 1.)/(10.-1.);
  wc = m_pi*value;
  value = (tan(wc/2)-1)/(tan(wc/2)+1);
  value *= DSP_CONTROL_MAX;
  m_DSPVals[kLoShelfFreq] = (long) value;
  SendDSPValue(kLoShelfFreq);

}

void CDSP56kManager::SetShelv1Boost(long value)
{

  SetBoostCut(value,kLoShelfGain);

}

void CDSP56kManager::SetShelv2Freq(long ivalue)
{

//  SetShelvFreq(value,kHiShelfFreq);
  double value,wc;

  if( ivalue >= 0 )
    SetRawValue(ivalue,kHiShelfFreq);
  value = m_RawVals[kHiShelfFreq];
  value /= DSP_CONTROL_MAX;   // normalize
  value *= FHCRANGE2;
  value += FHCBOTRANGE2;
  value = (pow(10.,value) - 1.)/(10.-1.);
  wc = m_pi*value;
  value = (tan(wc/2)-1)/(tan(wc/2)+1);
  value *= DSP_CONTROL_MAX;
  m_DSPVals[kHiShelfFreq] = (long) value;
  SendDSPValue(kHiShelfFreq);

}

void CDSP56kManager::SetShelv2Boost(long value)
{

  SetBoostCut(value,kHiShelfGain);

}

void CDSP56kManager::SetNotch1Freq(long value)
{

  SetNotchFreq(value,kNotch1Freq);

}

void CDSP56kManager::SetNotch1Q(long value)
{

  SetNotchQ(value,kNotch1Q,kNotch1Freq);

}

void CDSP56kManager::SetNotch1Cut(long value)
{

  SetBoostCut(value,kNotch1Cut);

}

void CDSP56kManager::SetNotch2Freq(long value)
{

  SetNotchFreq(value,kNotch2Freq);
```

```
}

void CDSP56kManager::SetNotch2Q(long value)
{

  SetNotchQ(value,kNotch2Q,kNotch2Freq);

}

void CDSP56kManager::SetNotch2Cut(long value)
{

  SetBoostCut(value,kNotch2Cut);

}


void CDSP56kManager::SetNotch9Freq(long value)
{

  double q,f,nf;

  SetNotchFreq(value,kNotch9Freq);
  f = ConvertFreqRange(kNotch9Freq);
  q = ConvertQRange(m_RawVals[kNotch9Q]);
  nf = f - (f / (5.*q));
  if( nf < 0. )
    nf = 0.;
  nf = pow(nf,0.5);
  nf = log10((nf * (10.-1.)) + 1.);
  nf -= FBOTRANGE;
  nf /= (FTOPRANGE-FBOTRANGE);
  nf *= DSP_CONTROL_MAX;     // normalize
  m_RawVals[kNotch8Freq] = (long) nf;
  nf = f + (f / (5.*q));
  if( nf > 1. )
    nf = 1.;
  nf = pow(nf,0.5);
  nf = log10((nf * (10.-1.)) + 1.);
  nf -= FBOTRANGE;
  nf /= (FTOPRANGE-FBOTRANGE);
  nf *= DSP_CONTROL_MAX;     // normalize
  m_RawVals[kNotchAFreq] = (long) nf;
  SetNotchFreq(-1L,kNotch8Freq);
  SetNotchFreq(-1L,kNotchAFreq);

}

void CDSP56kManager::SetNotch3Freq(long value)
{

  SetNotchFreq(value,kNotch3Freq);
  m_RawVals[kNotch5Freq] = (m_RawVals[kNotch4Freq] + m_RawVals[kNotch3Freq])/2;
  SetNotchFreq(-1L,kNotch5Freq);

}

void CDSP56kManager::SetNotch3Q(long value)
{

  SetNotchQ(value,kNotch3Q,kNotch3Freq);


}

void CDSP56kManager::SetNotch3Cut(long value)
{

  SetBoostCut(value,kNotch3Cut);

}
```

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```
void CDSP56kManager::Set[redacted]ch4Freq(long value)
{

  SetNotchFreq(value,kNotch4Freq);
  m_RawVals[kNotch5Freq] = (m_RawVals[kNotch4Freq] + m_RawVals[kNotch3Freq])/2;
  SetNotchFreq(-1L,kNotch5Freq);

}

void CDSP56kManager::SetNotch4Q(long value)
{

  SetNotchQ(value,kNotch4Q,kNotch4Freq);

}

void CDSP56kManager::SetNotch4Cut(long value)
{

  SetBoostCut(value,kNotch4Cut);

}

void CDSP56kManager::SetNotch5Q(long value)
{

  SetNotchQ(value,kNotch5Q,kNotch5Freq);

}

void CDSP56kManager::SetNotch5Boost(long value)
{

  SetBoostCut(value,kNotch5Cut);

}


double CDSP56kManager::DoConvertFreqRange(double val,double top, double bottom)
{

  val /= DSP_CONTROL_MAX;    // normalize
  val *= top - bottom;
  val += bottom;
  val = (pow(10.,val) - 1.)/(10.-1.);
  return( val );

}

double CDSP56kManager::ConvertFreqRange(int which)
{

  double fval;

  switch( which )
    {
      case kNotch1Freq:
      case kNotch2Freq:
        fval = DoConvertFreqRange(m_RawVals[which],FTOPRANGE3,FBOTRANGE3);     // top frequency is 0.1 * Nyquis
t
        fval /= SAMPLING_FREQ/2;
        break;
      default:
        fval = DoConvertFreqRange(m_RawVals[which],FTOPRANGE,FBOTRANGE);
        // square log scale
        fval = fval * fval;
        break;
    }
  return( fval );

}
```

0026

```
// converts Q range to log scale
#define QTOPRANGE 2.258
#define QBOTRANGE 0.037
#define QRANGE (QTOPRANGE-QBOTRANGE)

double CDSP56kManager::ConvertQRange(long ival)
{

  double val;

  val = ival;
  val /= DSP_CONTROL_MAX;    // normalize
  val *= QRANGE;
  val += QBOTRANGE;
  val = (pow(10.,val) - 1.)/(10.-1.);
  return( val );

}

// converts input value to log gain value
//#define LOG8  0.9031
#define LOGGAINSCALE  (log10(GAIN_SCALE))
double CDSP56kManager::ConvertBoostCutRange(long ival)
{

  double val;

  val = ival;
  val /= DSP_CONTROL_MAX;    // normalize
  val = (2.*val*LOGGAINSCALE) - LOGGAINSCALE;
  return( val );

}

void CDSP56kManager::SetRawValue(long value,long which)
{

  if( value )
    value += 1;
  value <<= CONTROL_RANGE_SC;
  m_RawVals[which] = value;

}

long CDSP56kManager::GetParamValue(long which)
{

  long value;

  if( which >= kUIArraySize )
    value = 0x400000L >> CONTROL_RANGE_SC;
  else
    value = m_RawVals[which] >> CONTROL_RANGE_SC;
  value--;
  if( value < 0 )
    value = 0;
  return( value );

}

void CDSP56kManager::SetParamValue(long value, long which)
{

    switch( which )
    {
    case kHiCutoff2Freq:
      SetHiCutoff2Freq(value);
      break;
    case kHiCutoff2Q:
      SetHiCutoff2Q(value);
      break;
    case kHiCutoffFreq:
```

```
    SetHiCutoffFreq(va    );
    break;
  case kHiCutoffQ:
    SetHiCutoffQ(value);
    break;
  case kLoCutoffFreq:
    SetLoCutoffFreq(value);
    break;
  case kLoCutoffQ:
    SetLoCutoffQ(value);
    break;
  case kBypass:
    SetBypass(value);
    break;
  case kDDXCompBypass:
    SetDDXCompBypass(value);
    break;
  case kHDCDBypass:
    SetHDCDBypass(value);
    break;
  case kHDCDGainScaleOff:
    SetHDCDGainScale(value);
    break;
  case kAnalogVolume:
    SetAnalogVolume(value);
    break;
  case kMainVolume:
    SetMainVolume(value);
    break;
  case kPreVolume:
    SetPreVolume(value);
    break;
  case kLoShelfFreq:
    SetShelv1Freq(value);
    break;
  case kHiShelfFreq:
    SetShelv2Freq(value);
    break;
  case kNotch8Cut:
    SetBoostCut(value,which);
    SetBoostCut(value,kNotchACut);       // same value for both notches
    break;
  case kNotch1Cut:
  case kNotch2Cut:
  case kNotch3Cut:
  case kNotch4Cut:
  case kNotch5Cut:
  case kNotch6Cut:
  case kNotch7Cut:
  case kLoShelfGain:
  case kHiShelfGain:
    SetBoostCut(value,which);
    break;
  case kNotch9Cut:
    m_DSPVals[kDSPNotch9Cut] = 0;      // fixed notch
    SendDSPValue(kDSPNotch9Cut);
    break;
  case kNotch3Freq:
    SetNotch3Freq(value);
    break;
  case kNotch4Freq:
    SetNotch4Freq(value);
    break;
  case kNotch9Freq:
    SetNotch9Freq(value);
    break;
  case kNotch1Freq:
  case kNotch2Freq:
  case kNotch5Freq:
  case kNotch6Freq:
  case kNotch7Freq:
  case kAllpassFreq:
```

```
      SetNotchFreq(val[redacted]ich);
      break;
    case kNotch8Q:
      SetNotchQ(value,which,which-1);
      SetNotchQ(value,kNotchAQ,kNotchAQ-1);   // same value for both notches
      break;
    case kNotch9Q:
      SetNotchQ(value,which,which-1);
      SetNotch9Freq(-1);
      break;
    case kNotch1Q:
    case kNotch2Q:
    case kNotch3Q:
    case kNotch4Q:
    case kNotch5Q:
    case kNotch6Q:
    case kNotch7Q:
    case kAllpassQ:
      SetNotchQ(value,which,which-1);
      break;
    case kDelay:
      SetDelay(value);
      break;
//    case kDBNotchWidth:
//      SetDelay(value);
      break;
    case kNotch8Freq:
    case kNotchAFreq:
    case kNotchACut:
    case kNotchAQ:
      break;
    }

}


void CDSP56kManager::SetDSPSettings(CStringArray & array)
{

  int i;
  CString string;
  int index;
  long value;
  int fileversion = 0;
  int j = 0;
  double fvalue;
  const char *sptr;

  // reset all parameters
  ResetAll();

  // first check for comment at head
  string = array.GetAt(0);
  sptr = string;
  if( strcmp(sptr,"# VERSION") == 0 )
    {
      string = array.GetAt(1);
      sptr = string;
      sscanf(sptr,"%d",&fileversion);
      j = 2;
    }
  for( i = j ; i < array.GetSize() ; i++ )
    {
        string = array.GetAt(i);
        sptr = string;
        if( sptr[0] == '#' ) continue;      // skip comments
        sscanf(sptr,"%d\t0x%x",&index,&value);
        if( index >= kUIArraySize ) continue;
        // Add any special treatment of parameters here
        if( fileversion == 0L )
        {
          switch( index )
```


0029

```
    {
    case kNotch1Freq:
    case kNotch2Freq:
      fvalue = DoConvertFreqRange(value,FTOPRANGE,FBOTRANGE);
      fvalue = fvalue * fvalue;
      fvalue *= SAMPLING_FREQ/2;
      fvalue = log10((fvalue * (10.-1.)) + 1.);
      fvalue -= FBOTRANGE3;
      fvalue /= (FTOPRANGE3-FBOTRANGE3);
      if( fvalue > 1.0 )
        fvalue = 1.0;
      fvalue *= DSP_CONTROL_MAX;     // normalize
      value = (long) fvalue;
      break;
      // increased low frequency
    case kHiShelfFreq:
      fvalue = DoConvertFreqRange(value,FHCTOPRANGE,FHCBOTRANGE);
      fvalue = log10((fvalue * (10.-1.)) + 1.);
      fvalue -= FHCBOTRANGE2;
      fvalue /= (FHCTOPRANGE-FHCBOTRANGE2);
      if( fvalue > 1.0 )
        fvalue = 1.0;
      fvalue *= DSP_CONTROL_MAX;     // normalize
      value = (long) fvalue;
      break;
    case kHiCutoffFreq:
      fvalue = DoConvertFreqRange(value,FHCTOPRANGE,FHCBOTRANGE);
      fvalue *= SAMPLING_FREQ/2;
      fvalue = log10((fvalue * (10.-1.)) + 1.);
      fvalue -= FHCBOTRANGE3;
      fvalue /= (FHCTOPRANGE3-FHCBOTRANGE3);
      if( fvalue > 1.0 )
        fvalue = 1.0;
      fvalue *= DSP_CONTROL_MAX;     // normalize
      value = (long) fvalue;
      break;
    }
  }
  else if( fileversion == 1L )
  {
    switch( index )
    {
    case kNotch1Freq:
    case kNotch2Freq:
      fvalue = DoConvertFreqRange(value,FTOPRANGE2,FBOTRANGE2);
      fvalue *= SAMPLING_FREQ/2;
      fvalue = log10((fvalue * (10.-1.)) + 1.);
      fvalue -= FBOTRANGE3;
      fvalue /= (FTOPRANGE3-FBOTRANGE3);
      if( fvalue > 1.0 )
        fvalue = 1.0;
      fvalue *= DSP_CONTROL_MAX;     // normalize
      value = (long) fvalue;
      break;
    case kLoCutoffFreq:
      fvalue = DoConvertFreqRange(value,FLCTOPRANGE,FLCBOTRANGE);
      fvalue *= SAMPLING_FREQ/2;
      fvalue = log10((fvalue * (10.-1.)) + 1.);
      fvalue -= FLCBOTRANGE2;
      fvalue /= (FLCTOPRANGE2-FLCBOTRANGE2);
      if( fvalue > 1.0 )
        fvalue = 1.0;
      fvalue *= DSP_CONTROL_MAX;     // normalize
      value = (long) fvalue;
      break;
    case kHiCutoff2Freq:
      fvalue = DoConvertFreqRange(value,FTOPRANGE,FBOTRANGE);
      fvalue *= SAMPLING_FREQ/2;
      fvalue = log10((fvalue * (10.-1.)) + 1.);
      fvalue -= FHC2BOT;
      fvalue /= (FHC2TOP-FHC2BOT);
      if( fvalue > 1.0 )
```

0030

```
            fvalue = 
            fvalue *= DSP_CONTROL_MAX;     // normalize
            value = (long) fvalue;
            break;
          case kHiCutoffFreq:
            fvalue = DoConvertFreqRange(value,FHCTOPRANGE,FHCBOTRANGE2);
            fvalue *= SAMPLING_FREQ/2;
            fvalue = log10((fvalue * (10.-1.)) + 1.);
            fvalue -= FHCBOTRANGE3;
            fvalue /= (FHCTOPRANGE3-FHCBOTRANGE3);
            if( fvalue > 1.0 )
              fvalue = 1.0;
            fvalue *= DSP_CONTROL_MAX;     // normalize
            value = (long) fvalue;
            break;
          }
        }
        m_RawVals[index] = value;
    }
  // tell DSP of changes
  for( i = 0 ; i < kUIArraySize ; i++ )
    {
    SetParamValue(-1,i);;
    }
  m_DSPVals[kDSPBypassMask] = m_RawVals[kBypassMask];
  SendDSPValue(kDSPBypassMask);

}

void CDSP56kManager::GetDSPSettings(CStringArray & array)
{

  char s[1000];
  int i,index;
  int j = 0;
  CString cstr;

  // write header (so far only version number)
  cstr = "# VERSION";
  array.SetAtGrow(j++, cstr);
  sprintf(s,"%d",FILE_VERSION);
  array.SetAtGrow(j++, s);
  cstr = "# DATA";
  array.SetAtGrow(j++, cstr);

  for( i = 0 ; i < kUIArraySize ; i++ )
    {
        index = kUIArraySize-i-i;
        if( index == kBypass ) continue;
        if( index == kHDCDBypass ) continue;
        if( index == kHDCDGainScaleOff ) continue;
        if( index == kAnalogIn ) continue;
        // MM 7/14/99 Added value in human readable form as comment
        GetStringValue(index,cstr);
        sprintf(s,"# %s %s",m_ParamNames[index],cstr);
        array.SetAtGrow(j++, s);
        sprintf(s,"%d\t0x%x",index,m_RawVals[index]);
        array.SetAtGrow(j++, s);
    }

}

void CDSP56kManager::GetFilterBlob(CStringArray & array)
{

  char s[1000];
  int param;
  int j = 0;
  CString cstr;
  float v;

  // write version number
```


0031

```
//  cstr = "# VERSION";
//  array.SetAtGrow(j++, cstr);
  sprintf(s,"%d",BLOB_FILE_VERSION);
  array.SetAtGrow(j++, s);

  // output delay
  param = kDelay;
  GetPureStringValue(param,cstr);
  sscanf(cstr,"%f",&v);
  if( v != 0. )
  {
//  cstr = m_ParamNames[param];
//  array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_DELAY);
    array.SetAtGrow(j++, s);
    cstr = "1";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(param,cstr);
    array.SetAtGrow(j++, cstr);
  }

  // output pre-gain
  param = kPreVolume;
//  cstr = m_ParamNames[param];
//  array.SetAtGrow(j++, cstr);
  sprintf(s,"%d",BLOCK_GAIN);
  array.SetAtGrow(j++, s);
  cstr = "1";
  array.SetAtGrow(j++, cstr);
  GetPureStringValue(param,cstr);
  array.SetAtGrow(j++, cstr);

  // lo-shelf
  if( !GetBypassSection(kBypassLoshelf) )
  {
//    cstr = "Low-Shelf";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_LS);
    array.SetAtGrow(j++, s);
    cstr = "2";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kLoShelfFreq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kLoShelfGain,cstr);
    array.SetAtGrow(j++, cstr);
  }

  // hi-shelf
  if( !GetBypassSection(kBypassHiShelf) )
  {
//    cstr = "High-Shelf";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_HS);
    array.SetAtGrow(j++, s);
    cstr = "2";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kHiShelfFreq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kHiShelfGain,cstr);
    array.SetAtGrow(j++, cstr);
  }

  // low peaking cutoff
  if( !GetBypassSection(kBypassHipass) )
  {
//    cstr = "Low Cutoff";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_HP);
    array.SetAtGrow(j++, s);
    cstr = "2";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kLoCutoffFreq,cstr);
```

```
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kLoCutoffQ,cstr);
    array.SetAtGrow(j++, cstr);
  }

  // high peaking cutoff #1
  if( !GetBypassSection(kBypassLopass) )
  {
//    cstr = "High Cutoff";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_LP);
    array.SetAtGrow(j++, s);
    cstr = "2";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kHiCutoffFreq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kHiCutoffQ,cstr);
    array.SetAtGrow(j++, cstr);
  }

  // high peaking cutoff #2
  if( !GetBypassSection(kBypassNLopass) )
  {
//    cstr = "High Cutoff #2";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_LP2);
    array.SetAtGrow(j++, s);
    cstr = "2";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kHiCutoff2Freq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kHiCutoff2Q,cstr);
    array.SetAtGrow(j++, cstr);
  }

  // resonance comp #1
  if( !GetBypassSection(kBypassNotch1) )
  {
//    cstr = "Parametric EQ";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_PEQ);
    array.SetAtGrow(j++, s);
    cstr = "3";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch1Freq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch1Q,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch1Cut,cstr);
    array.SetAtGrow(j++, cstr);
  }

  // resonance comp #2
  if( !GetBypassSection(kBypassNotch2) )
  {
//    cstr = "Parametric EQ";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_PEQ);
    array.SetAtGrow(j++, s);
    cstr = "3";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch2Freq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch2Q,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch2Cut,cstr);
    array.SetAtGrow(j++, cstr);
  }

  // resonance comp #3
  if( !GetBypassSection(kBypassNotch3) )
  {
```

```
//    cstr = "Parametric EQ";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_PEQ);
    array.SetAtGrow(j++, s);
    cstr = "3";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch6Freq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch6Q,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch6Cut,cstr);
    array.SetAtGrow(j++, cstr);
  }

  // resonance comp #4
  if( !GetBypassSection(kBypassNotch4) )
  {
//    cstr = "Parametric EQ";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_PEQ);
    array.SetAtGrow(j++, s);
    cstr = "3";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch7Freq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch7Q,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch7Cut,cstr);
    array.SetAtGrow(j++, cstr);
  }

  // conecry
  if( !GetBypassSection(kBypassConecry) )
  {
//    cstr = "Parametric EQ";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_PEQ);
    array.SetAtGrow(j++, s);
    cstr = "3";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch3Freq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch3Q,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch3Cut,cstr);
    array.SetAtGrow(j++, cstr);

//    cstr = "Parametric EQ";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_PEQ);
    array.SetAtGrow(j++, s);
    cstr = "3";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch4Freq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch4Q,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch4Cut,cstr);
    array.SetAtGrow(j++, cstr);

//    cstr = "Parametric EQ";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_PEQ);
    array.SetAtGrow(j++, s);
    cstr = "3";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch5Freq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch5Q,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch5Cut,cstr);
    array.SetAtGrow(j++, cstr);
```

```
  }

  // allpass
  if( !GetBypassSection(kBypassAllpass) )
  {
//    cstr = "Parametric EQ";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_AP);
    array.SetAtGrow(j++, s);
    cstr = "2";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kAllpassFreq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kAllpassQ,cstr);
    array.SetAtGrow(j++, cstr);
  }

  // double-tuned notch
  if( !GetBypassSection(kBypassDBNotch) )
  {
//    cstr = "Parametric EQ";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_PEQ);
    array.SetAtGrow(j++, s);
    cstr = "3";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch8Freq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch8Q,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch8Cut,cstr);
    array.SetAtGrow(j++, cstr);

//    cstr = "Parametric EQ";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_PEQ);
    array.SetAtGrow(j++, s);
    cstr = "3";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch9Freq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch9Q,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotch9Cut,cstr);
    array.SetAtGrow(j++, cstr);

//    cstr = "Parametric EQ";
//    array.SetAtGrow(j++, cstr);
    sprintf(s,"%d",BLOCK_PEQ);
    array.SetAtGrow(j++, s);
    cstr = "3";
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotchAFreq,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotchAQ,cstr);
    array.SetAtGrow(j++, cstr);
    GetPureStringValue(kNotchACut,cstr);
    array.SetAtGrow(j++, cstr);

  }

  // output post-gain
  param = kMainVolume;
//  cstr = m_ParamNames[param];
//  array.SetAtGrow(j++, cstr);
  sprintf(s,"%d",BLOCK_GAIN);
  array.SetAtGrow(j++, s);
  cstr = "1";
  array.SetAtGrow(j++, cstr);
  GetPureStringValue(param,cstr);
  array.SetAtGrow(j++, cstr);
```

```
}

void CDSP56kManager::SetPreVolume(long value)
{

  double fvalue;

  if( value >= 0 )
    SetRawValue(value,kPreVolume);
  if( m_RawVals[kPreVolume] == DSP_CONTROL_MAX )
    m_DSPVals[kDSPPreVolume] = -m_RawVals[kPreVolume];
  else if( m_RawVals[kPreVolume] == 0 )
    m_DSPVals[kDSPPreVolume] = 0;
  else
    {
      fvalue = m_RawVals[kPreVolume];
      fvalue /= DSP_CONTROL_MAX;     // normalize
      fvalue *= VOLRANGE;
      fvalue += VOLBOT;
      fvalue = (pow(10.,fvalue) - 1.)/(10.-1.);
      fvalue *= DSP_CONTROL_MAX;
      m_DSPVals[kDSPPreVolume] = (long) -fvalue;
    }
  SendDSPValue(kDSPPreVolume);

}

void CDSP56kManager::SetAnalogVolume(long value)
{

  double fvalue;

  if( value >= 0 )
    SetRawValue(value,kAnalogVolume);
  if( m_RawVals[kAnalogVolume] == DSP_CONTROL_MAX )
    m_DSPVals[kDSPAnalogVol] = -m_RawVals[kAnalogVolume];
  else if( m_RawVals[kAnalogVolume] == 0 )
    m_DSPVals[kDSPAnalogVol] = 0;
  else
    {
      fvalue = m_RawVals[kAnalogVolume];
      fvalue /= DSP_CONTROL_MAX;     // normalize
      fvalue *= VOLRANGE;
      fvalue += VOLBOT;
      fvalue = (pow(10.,fvalue) - 1.)/(10.-1.);
      fvalue *= DSP_CONTROL_MAX;
      m_DSPVals[kDSPAnalogVol] = (long) -fvalue;
    }
  SendDSPValue(kDSPAnalogVol);

}


void CDSP56kManager::SetBypass(long value)
{

  if( value >= 0 )
    SetRawValue(value,kBypass);
  if( m_RawVals[kBypass] )
    m_DSPVals[kDSPBypass] = 0x7FFFFF;
  else
    m_DSPVals[kDSPBypass] = 0;
  SendDSPValue(kDSPBypass);


}

void CDSP56kManager::SetLoCutoffFreq(long value)
{

  if( value >= 0 )
    SetRawValue(value,kLoCutoffFreq);
```

```
  SetLoCutoff();
}

void CDSP56kManager::SetLoCutoffQ(long value)
{

  if( value >= 0 )
    SetRawValue(value,kLoCutoffQ);
  SetLoCutoff();

}

void CDSP56kManager::SetHiCutoffFreq(long value)
{

  if( value >= 0 )
    SetRawValue(value,kHiCutoffFreq);
  SetHiCutoff();

}

void CDSP56kManager::SetHiCutoffQ(long value)
{

  if( value >= 0 )
    SetRawValue(value,kHiCutoffQ);
  SetHiCutoff();

}

void CDSP56kManager::SetHiCutoff2Freq(long value)
{

  if( value >= 0 )
    SetRawValue(value,kHiCutoff2Freq);
  SetHiCutoff2();

}

void CDSP56kManager::SetHiCutoff2Q(long value)
{

  if( value >= 0 )
    SetRawValue(value,kHiCutoff2Q);
  SetHiCutoff2();

}


void CDSP56kManager::SetHiCutoff()
{

  double f,q;
  double a1,a2,b0;

  q = m_RawVals[kHiCutoffQ];
  q /= DSP_CONTROL_MAX;   // normalize
  q *= QLCRANGE;
  q += QLCBOTRANGE;
  q = (pow(10.,q) - 1.)/(10.-1.);
  if( q >= 1. )
    q = 0.99999;

  /*f = m_RawVals[kHiCutoffFreq];
  f /= DSP_CONTROL_MAX;   // normalize
  f *= FHCRANGE2;
  f += FHCBOTRANGE2;
  f = (pow(10.,f) - 1.)/(10.-1.); */
  f = DoConvertFreqRange(m_RawVals[kHiCutoffFreq],FHCTOPRANGE3,FHCBOTRANGE3);
  f /= SAMPLING_FREQ/2;
  f = 2. * sin( f * m_pi / 2.);
```

0037

```
  a2 = 1. - f * q;
  if( a2 >= 2. )
    a2 = 1.99999;
  else if( a2 <= -2. )
    a2 = -1.99999;
  a1 = -(2. - f * q - f * f);
  if( a1 >= 2. )
    a1 = 1.99999;
  else if( a1 <= -2. )
    a1 = -1.99999;
  b0 = f * f / 2.;
  if( b0 >= 8. )
    b0 = 7.99999;
  else if( b0 <= -8. )
    b0 = -7.99999;

  m_DSPVals[kDSPHiCutoffA2] = (long) (a2 * DSP_CONTROL_MAX/ 2.);
  SendDSPValue(kDSPHiCutoffA2);
  m_DSPVals[kDSPHiCutoffA1] = (long) (a1 * DSP_CONTROL_MAX/2.);
  SendDSPValue(kDSPHiCutoffA1);
  m_DSPVals[kDSPHiCutoffScale] = (long) (b0 * DSP_CONTROL_MAX/ 16.);
  SendDSPValue(kDSPHiCutoffScale);

}

void CDSP56kManager::SetHiCutoff2()
{

  double f,q;
  double a1,a2,b0;
  double gamma,beta,lambda,alpha;

  q = DSP_CONTROL_MAX - m_RawVals[kHiCutoff2Q]; // invert scale
  q /= DSP_CONTROL_MAX;                         // normalize
  q *= (QHC2TOP-QHC2BOT);
  q += QHC2BOT;
  q = (pow(10.,q) - 1.)/(10.-1.);
//  f = ConvertFreqRange(kHiCutoff2Freq);
  f = DoConvertFreqRange(m_RawVals[kHiCutoff2Freq],FHC2TOP,FHC2BOT);
  f /= SAMPLING_FREQ/2;

  gamma = - cos(f * m_pi);
  beta = (1. - sin(f*m_pi/(2*q)))/(1. + sin(f*m_pi/(2*q)));
  if( beta > 2.0 )
    beta = 2.0;
  lambda = 4. * beta * (gamma/(1.+beta));
  if( lambda > 2.0 )
    lambda = 2.0;
  alpha = 1. + beta + lambda;

  a2 = beta;
  a1 = lambda;
  b0 = alpha / 4.;
  if( b0 >= 8. )
    b0 = 7.99999;
  else if( b0 <= -8. )
    b0 = -7.99999;

  m_DSPVals[kDSP2HiCutoffA2] = (long) (a2 * DSP_CONTROL_MAX/ 2.);
  SendDSPValue(kDSP2HiCutoffA2);
  m_DSPVals[kDSP2HiCutoffA1] = (long) (a1 * DSP_CONTROL_MAX/2.);
  SendDSPValue(kDSP2HiCutoffA1);
  m_DSPVals[kDSP2HiCutoffScale] = (long) (b0 * DSP_CONTROL_MAX/ 16.);
  SendDSPValue(kDSP2HiCutoffScale);

}

void CDSP56kManager::SetLoCutoff()
{

  double f,q,scale_factor;
```

```
    q = m_RawVals[kLoCutoffQ];
    q /= DSP_CONTROL_MAX;    // normalize
    q *= QLCRANGE;
    q += QLCBOTRANGE;
    q = (pow(10.,q) - 1.)/(10.-1.);
    if( q >= 1. )
      q = 0.99999;
    f = m_RawVals[kLoCutoffFreq];
    f /= DSP_CONTROL_MAX;    // normalize
    f *= (FLCTOPRANGE2-FLCBOTRANGE2);
    f += FLCBOTRANGE2;
    f = (pow(10.,f) - 1.)/(10.-1.);
    f /= SAMPLING_FREQ/2;
    f = 2. * sin( f * m_pi / 2.);
    if( f >= 1. )
      f = 0.99999;
    scale_factor = (4. - 2. * f * q - f * f)/4.;

    m_DSPVals[kDSPLoCutoffFc] = (long) (f * DSP_CONTROL_MAX);
    SendDSPValue(kDSPLoCutoffFc);
    m_DSPVals[kDSPLoCutoffQc] = (long) (q * DSP_CONTROL_MAX);
    SendDSPValue(kDSPLoCutoffQc);
    m_DSPVals[kDSPLoCutoffScale] = (long) (-0.5 * scale_factor * DSP_CONTROL_MAX);
    SendDSPValue(kDSPLoCutoffScale);
}


void CDSP56kManager::SetDDXCompBypass(long value)
{

  if( value >= 0 )
    SetRawValue(value,kDDXCompBypass);
  if( m_RawVals[kDDXCompBypass] )
    m_DSPVals[kDSPDDXCompBypass] = 0x7FFFFF;
  else
    m_DSPVals[kDSPDDXCompBypass] = 0;
  SendDSPValue(kDSPDDXCompBypass);


}

void CDSP56kManager::SetHDCDBypass(long value)
{

  if( value >= 0 )
    SetRawValue(value,kHDCDBypass);
  if( m_RawVals[kHDCDBypass] )
    m_DSPVals[kDSPHDCDBypass] = 0x7FFFFF;
  else
    m_DSPVals[kDSPHDCDBypass] = 0;
  SendDSPValue(kDSPHDCDBypass);


}

void CDSP56kManager::SetHDCDGainScale(long value)
{

  if( value >= 0 )
    SetRawValue(value,kHDCDGainScaleOff);
  if( m_RawVals[kHDCDGainScaleOff] )
    m_DSPVals[kDSPHDCDGainScaleOff] = 0x7FFFFF;
  else
    m_DSPVals[kDSPHDCDGainScaleOff] = 0;
  SendDSPValue(kDSPHDCDGainScaleOff);

}

void CDSP56kManager::ResetAll()
{
```

```
    int i;
    for( i = 0 ; i < kUIArraySize ; i++ )
      {
      m_RawVals[i] = 0x400000L;
      }
    for( i = 0 ; i < kDSPArraySize ; i++ )
      {
      m_DSPVals[i] = 0;
      }

    m_RawVals[kAnalogVolume] = 0x800000L;
    m_RawVals[kMainVolume] = 0x800000L;
    m_RawVals[kPreVolume] = 0x800000L;
    m_RawVals[kBypass] = 0x000000L;
    m_RawVals[kHDCDBypass] = 0x000000L;
    m_RawVals[kDDXCompBypass] = 0x000000L;
    m_RawVals[kHDCDGainScaleOff] = 0x000000L;
    m_RawVals[kAnalogIn] = 0x000000L;
    m_RawVals[kDelay] = 0x000000L;

    m_RawVals[kHiCutoff2Freq] = 0x600000L;
    m_RawVals[kHiCutoff2Q] = 0x200000L;
    m_RawVals[kHiCutoffFreq] = 0x600000L;
    m_RawVals[kHiCutoffQ] = 0x200000L;
    m_RawVals[kLoCutoffFreq] = 0x40000L;
    m_RawVals[kLoCutoffQ] = 0x200000L;

    m_DSPReturn = 0;

    for( i = 0 ; i < kUIArraySize ; i++ )
    {
    SetParamValue(-1,i);
    }

    m_DSPVals[kDSPBypassMask] = m_RawVals[kBypassMask] = 0L;
    SendDSPValue(kDSPBypassMask);

}

void CDSP56kManager::SetNotch6Freq(long value)
{

  SetNotchFreq(value,kNotch6Freq);

}

void CDSP56kManager::SetNotch6Q(long value)
{

  SetNotchQ(value,kNotch6Q,kNotch6Freq);

}

void CDSP56kManager::SetNotch6Cut(long value)
{

  SetBoostCut(value,kNotch6Cut);

}

void CDSP56kManager::SetNotch7Freq(long value)
{

  SetNotchFreq(value,kNotch7Freq);

}

void CDSP56kManager::SetNotch7Q(long value)
{

  SetNotchQ(value,kNotch7Q,kNotch7Freq);
```

```
}

void CDSP56kManager::SetNotch7Cut(long value)
{

  SetBoostCut(value,kNotch7Cut);

}


int CDSP56kManager::GetHDCDMode()
{

//  SetParamValue(-1,kMainVolume);
//  return( m_DSPReturn );
  return( m_Comm->GetDetectState() );

}

void CDSP56kManager::SetAnalogInput(long value)
{

  if( value >= 0 )
    SetRawValue(value,kAnalogIn);
  if( m_RawVals[kAnalogIn] )
    m_DSPVals[kDSPAnalogIn] = 0x7FFFFF;
  else
    m_DSPVals[kDSPAnalogIn] = 0;
  SendDSPValue(kDSPAnalogIn);

}

BOOL CDSP56kManager::IsReady()
{

  return( m_Comm->CheckState() );

}

void CDSP56kManager::GetPureStringValue(int which, CString &str)
{
    int count;

    GetStringValue(which,str);
    str.TrimLeft();
    count = str.Find(' ');
    if( count >= 0 )
      str = str.Left(count);
}

void CDSP56kManager::GetStringValue(int which,CString &str)
{

    double value;
    char s[100];

    switch( which )
    {
    case kAnalogVolume:
    case kMainVolume:
    case kPreVolume:
      value = m_RawVals[which];
      value /= DSP_CONTROL_MAX;
      value = 20 * log10(value);
      sprintf(s,"%10.2f dB",value);
      str = s;
      break;
    case kHiCutoffFreq:
      /* value = m_RawVals[which];
      value /= DSP_CONTROL_MAX;    // normalize
      value *= FHCRANGE2;
```

```
    value += FHCBOTRA[redacted];
    value = (pow(10.,value) - 1.)/(10.-1.);
    value *= SAMPLING_FREQ/2; */
    value = DoConvertFreqRange(m_RawVals[kHiCutoffFreq],FHCTOPRANGE3,FHCBOTRANGE3);
    sprintf(s,"%10.2f Hz",value);
    str = s;
    break;
  case kHiCutoff2Q:
    value = DSP_CONTROL_MAX - m_RawVals[kHiCutoff2Q];
    value /= DSP_CONTROL_MAX;    // normalize
    value *= QHC2TOP-QHC2BOT;
    value += QHC2BOT;
    value = (pow(10.,value) - 1.)/(10.-1.);
    sprintf(s,"%10.2f",value);
    str = s;
    break;
  case kHiCutoffQ:
    value = m_RawVals[kHiCutoffQ];
    value /= DSP_CONTROL_MAX;    // normalize
    value *= QLCRANGE;
    value += QLCBOTRANGE;
    value = (pow(10.,value) - 1.)/(10.-1.);
    if( value >= 1. )
      value = 0.99999;
    sprintf(s,"%10.2f",value);
    str = s;
    break;
  case kLoCutoffFreq:
    value = m_RawVals[kLoCutoffFreq];
    value /= DSP_CONTROL_MAX;    // normalize
    value *= (FLCTOPRANGE2-FLCBOTRANGE2);
    value += FLCBOTRANGE2;
    value = (pow(10.,value) - 1.)/(10.-1.);
    sprintf(s,"%10.2f Hz",value);
    str = s;
    break;
  case kLoCutoffQ:
    value = m_RawVals[kLoCutoffQ];
    value /= DSP_CONTROL_MAX;    // normalize
    value *= QLCRANGE;
    value += QLCBOTRANGE;
    value = (pow(10.,value) - 1.)/(10.-1.);
    if( value >= 1. )
      value = 0.99999;
    sprintf(s,"%10.2f",value);
    str = s;
    break;
  case kLoShelfFreq:
    value = m_RawVals[kLoShelfFreq];
    value /= DSP_CONTROL_MAX;    // normalize
    value *= FLCRANGE;
    value += FLCBOTRANGE;
    value = (pow(10.,value) - 1.)/(10.-1.);
    value *= SAMPLING_FREQ/2;
    sprintf(s,"%10.2f Hz",value);
    str = s;
    break;
  case kHiShelfFreq:
    value = m_RawVals[kHiShelfFreq];
    value /= DSP_CONTROL_MAX;    // normalize
    value *= FHCRANGE2;
    value += FHCBOTRANGE2;
    value = (pow(10.,value) - 1.)/(10.-1.);
    value *= SAMPLING_FREQ/2;
    sprintf(s,"%10.2f Hz",value);
    str = s;
    break;
  case kNotch1Cut:
  case kNotch2Cut:
  case kNotch3Cut:
  case kNotch4Cut:
  case kNotch5Cut:
```

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```
    case kNotch6Cut:
    case kNotch7Cut:
    case kNotch8Cut:
    case kNotch9Cut:
    case kNotchACut:
    case kLoShelfGain:
    case kHiShelfGain:
      value = 20 * ConvertBoostCutRange(m_RawVals[which]);
      sprintf(s,"%10.2f dB",value);
      str = s;
      break;
    case kNotch1Freq:
    case kNotch2Freq:
    case kNotch3Freq:
    case kNotch4Freq:
    case kNotch5Freq:
    case kNotch6Freq:
    case kNotch7Freq:
    case kNotch8Freq:
    case kNotch9Freq:
    case kNotchAFreq:
    case kAllpassFreq:
      value = ConvertFreqRange(which);
      value *= SAMPLING_FREQ/2;
      sprintf(s,"%10.2f Hz",value);
      str = s;
      break;
    case kHiCutoff2Freq:
      value = DoConvertFreqRange(m_RawVals[kHiCutoff2Freq],FHC2TOP,FHC2BOT);
      sprintf(s,"%10.2f Hz",value);
      str = s;
      break;
    case kNotch1Q:
    case kNotch2Q:
    case kNotch3Q:
    case kNotch4Q:
    case kNotch5Q:
    case kNotch6Q:
    case kNotch7Q:
    case kNotch8Q:
    case kNotch9Q:
    case kNotchAQ:
    case kAllpassQ:
      value = ConvertQRange(m_RawVals[which]);
      sprintf(s,"%10.2f",value);
      str = s;
      break;
    case kDelay:
      value = m_RawVals[which];
      value /= DSP_CONTROL_MAX;
      value *= DELAY_LENGTH;
      value /= SAMPLING_FREQ;
      value *= 1000.;
      sprintf(s,"%10.2f mS",value);
      str = s;
      break;
    default:
      str = "fixed";
      break;
    }

}

BOOL CDSP56kManager::IsBusy()
{

    return( m_Comm->IsTransmitting() );

}

void CDSP56kManager::SetBypassSection(BOOL value, int which)
{
```

```
  long mask = 1L << which;

  if( value )
    {
      m_RawVals[kBypassMask] |= mask;
    }
  else
    {
      mask = ~mask;
      m_RawVals[kBypassMask] &= mask;
    }
  m_DSPVals[kDSPBypassMask] = m_RawVals[kBypassMask];
  SendDSPValue(kDSPBypassMask);

}

BOOL CDSP56kManager::GetBypassSection(int which)
{

  long mask = 1L << which;

  return( (m_RawVals[kBypassMask] & mask) != 0 );

}

void CDSP56kManager::SetDelay(long value)
{

  if( value >= 0 )
    SetRawValue(value,kDelay);
  m_DSPVals[kDSPDelay] = m_RawVals[kDelay];
  SendDSPValue(kDSPDelay);


}
```

```
// UI IDs
enum {
    kMainVolume,
    kLoShelfFreq,
    kLoShelfGain,
    kHiShelfFreq,
    kHiShelfGain,
    kNotch1Freq,
    kNotch1Q,
    kNotch1Cut,
    kNotch2Freq,
    kNotch2Q,
    kNotch2Cut,
    kNotch3Freq,
    kNotch3Q,
    kNotch3Cut,
    kNotch4Freq,
    kNotch4Q,
    kNotch4Cut,
    kNotch5Freq,
    kNotch5Q,
    kNotch5Cut,
    kPreVolume,
    kBypass,
    kLoCutoffFreq,
    kLoCutoffQ,
    kHiCutoffFreq,
    kHiCutoffQ,
    kHDCDBypass,
    kHDCDGainScaleOff,
    kDDXCompBypass,
    kNotch6Freq,
    kNotch6Q,
    kNotch6Cut,
    kNotch7Freq,
    kNotch7Q,
    kNotch7Cut,
    kAnalogIn,
    kAnalogVolume,
    kDelay,
    kAllpassFreq,
    kAllpassQ,
    kBypassMask,
    kHiCutoff2Freq,
    kHiCutoff2Q,
    kNotch8Freq,
    kNotch8Q,
    kNotch8Cut,
    kNotch9Freq,
    kNotch9Q,
    kNotch9Cut,
    kNotchAFreq,
    kNotchAQ,
    kNotchACut,
    kDBNotchWidth
};

#define kUIArraySize  (kDBNotchWidth+1)

// orphaned control IDs
/*
#define kNotch6Freq   (10000+20)
#define kNotch6Q      (10000+21)
#define kNotch6Boost  (10000+22)
#define kNotch7Freq   (10000+23)
#define kNotch7Q      (10000+24)
#define kNotch7Boost  (10000+25)
#define kLoShelf2Freq (10000+26)
#define kLoShelf2Boost  (10000+27)
#define kHiShelf2Freq (10000+28)
#define kHiShelf2Boost  (10000+29)
```

```
*/

// DSP IDs
enum {
    kDSPMainVolume,
    kDSPLoShelfFreq,
    kDSPLoShelfGain,
    kDSPHiShelfFreq,
    kDSPHiShelfGain,
    kDSPNotch1Freq,
    kDSPNotch1Q,
    kDSPNotch1Cut,
    kDSPNotch2Freq,
    kDSPNotch2Q,
    kDSPNotch2Cut,
    kDSPNotch3Freq,
    kDSPNotch3Q,
    kDSPNotch3Cut,
    kDSPNotch4Freq,
    kDSPNotch4Q,
    kDSPNotch4Cut,
    kDSPNotch5Freq,
    kDSPNotch5Q,
    kDSPNotch5Cut,
    kDSPPreVolume,
    kDSPBypass,
    kDSPLoCutoffScale,
    kDSPLoCutoffFc,
    kDSPLoCutoffQc,
    kDSPHiCutoffScale,
    kDSPHiCutoffA2,
    kDSPHiCutoffA1,
    kDSPHDCDBypass,
    kDSPHDCDGainScaleOff,
    kDSPDDXCompBypass,
    kDSPNotch6Freq,
    kDSPNotch6Q,
    kDSPNotch6Cut,
    kDSPNotch7Freq,
    kDSPNotch7Q,
    kDSPNotch7Cut,
    kDSPAnalogIn,
    kDSPAnalogVol,
    kDSPBypassMask,
    kDSPDelay,
    kDSPAllpassFreq,
    kDSPAllpassQ,
    kDSP2HiCutoffScale,
    kDSP2HiCutoffA2,
    kDSP2HiCutoffA1,
    kDSPNotch8Freq,
    kDSPNotch8Q,
    kDSPNotch8Cut,
    kDSPNotch9Freq,
    kDSPNotch9Q,
    kDSPNotch9Cut,
    kDSPNotchAFreq,
    kDSPNotchAQ,
    kDSPNotchACut
};

#define kDSPArraySize (kDSPNotchACut+1)

// bit definitions for kDSPBypassMask above
enum {
  kBypassNotch1,
  kBypassNotch2,
  kBypassNotch3,
  kBypassNotch4,
  kBypassHipass,
  kBypassLopass,
  kBypassLoshelf,
```

```
    kBypassHiShelf,
    kBypassConecry,
    kBypassAllpass,
    kBypassDBNotch,
    kBypassNLopass
};
```

```
#if !defined(AFX_DBNOTCH_H__241CC3C5_14D9_11D3_96EE_006097CDB9E2__INCLUDED_)
#define AFX_DBNOTCH_H__241CC3C5_14D9_11D3_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000
// DBNotch.h : header file
//

class CTabDialog;

/////////////////////////////////////////////////////////////////////////////
// CDBNotch dialog

class CDBNotch : public CPropertyPage
{
  DECLARE_DYNCREATE(CDBNotch)

// Construction
public:
  CDBNotch();
  ~CDBNotch();

// Dialog Data
  //{{AFX_DATA(CDBNotch)
  enum { IDD = IDD_PP11 };
  CButton m_Bypass;
  CSliderCtrl m_CompGainSlider;
  CSliderCtrl m_CompQSlider;
  CSliderCtrl m_QSlider;
  CSliderCtrl m_FreqSlider;
  //}}AFX_DATA


// Overrides
  // ClassWizard generate virtual function overrides
  //{{AFX_VIRTUAL(CDBNotch)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:
  // Generated message map functions
  //{{AFX_MSG(CDBNotch)
  afx_msg void OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar);
  afx_msg void OnPaint();
  virtual BOOL OnInitDialog();
  afx_msg void OnBypass();
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()

  CTabDialog *m_ParentWindow;
  void SendStringToUI(int which);

};

//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_DBNOTCH_H__241CC3C5_14D9_11D3_96EE_006097CDB9E2__INCLUDED_)
```

```
// DBNotch.cpp : implementation file
//

#include "stdafx.h"
#include "sa.h"
#include "DBNotch.h"
#include "TabDialog.h"
#include "DSP56kManager.h"

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CDBNotch property page

IMPLEMENT_DYNCREATE(CDBNotch, CPropertyPage)

CDBNotch::CDBNotch() : CPropertyPage(CDBNotch::IDD)
{
  //{{AFX_DATA_INIT(CDBNotch)
    // NOTE: the ClassWizard will add member initialization here
  //}}AFX_DATA_INIT
}

CDBNotch::~CDBNotch()
{
}

void CDBNotch::DoDataExchange(CDataExchange* pDX)
{
  CPropertyPage::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CDBNotch)
  DDX_Control(pDX, IDC_CHECK5, m_Bypass);
  DDX_Control(pDX, IDC_SLIDER6, m_CompGainSlider);
  DDX_Control(pDX, IDC_SLIDER5, m_CompQSlider);
  DDX_Control(pDX, IDC_SLIDER2, m_QSlider);
  DDX_Control(pDX, IDC_SLIDER1, m_FreqSlider);
  //}}AFX_DATA_MAP
}


BEGIN_MESSAGE_MAP(CDBNotch, CPropertyPage)
  //{{AFX_MSG_MAP(CDBNotch)
  ON_WM_VSCROLL()
  ON_WM_PAINT()
  ON_BN_CLICKED(IDC_CHECK5, OnBypass)
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CDBNotch message handlers

void CDBNotch::OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar)
{
  // TODO: Add your message handler code here and/or call default
  CSliderCtrl *slider = (CSliderCtrl *)pScrollBar;
  int which;

  CPropertyPage::OnVScroll(nSBCode, nPos, pScrollBar);

  Sleep(50);
  if( slider == &m_FreqSlider )
    which = kNotch9Freq;
  else if( slider == &m_QSlider )
    which = kNotch9Q;
  else if( slider == &m_CompQSlider )
    which = kNotch8Q;
  else if( slider == &m_CompGainSlider )
    which = kNotch8Cut;
```

```
    else
      return;
    g_DSPManager->SetParamValue(CONTROL_RANGE-slider->GetPos(),which);
    SendStringToUI(which);

}

void CDBNotch::OnPaint()
{
  CPaintDC dc(this); // device context for painting

  // TODO: Add your message handler code here
  m_FreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch9Freq));
  m_QSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch9Q));
  m_CompQSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch8Q));
  m_CompGainSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch8Cut));

  m_Bypass.SetCheck(g_DSPManager->GetBypassSection(kBypassDBNotch));

  // Do not call CPropertyPage::OnPaint() for painting messages
}

BOOL CDBNotch::OnInitDialog()
{
  CPropertyPage::OnInitDialog();

  // TODO: Add extra initialization here
  m_FreqSlider.SetRange(0,CONTROL_RANGE);
  m_FreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch9Freq));
  m_FreqSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_QSlider.SetRange(0,CONTROL_RANGE);
  m_QSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch9Q));
  m_QSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_CompQSlider.SetRange(0,CONTROL_RANGE);
  m_CompQSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch8Q));
  m_CompQSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_CompGainSlider.SetRange(0,CONTROL_RANGE);
  m_CompGainSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch8Cut));
  m_CompGainSlider.SetTicFreq((CONTROL_RANGE+1)/16);


  m_ParentWindow = (CTabDialog *) GetParent()->GetParent();

  return TRUE;  // return TRUE unless you set the focus to a control
                // EXCEPTION: OCX Property Pages should return FALSE
}

void CDBNotch::SendStringToUI(int which)
{

    CString str;

    g_DSPManager->GetStringValue(which,str);
    m_ParentWindow->SetStatusString(0,str);

}


void CDBNotch::OnBypass()
{
  // TODO: Add your control notification handler code here
  int state = m_Bypass.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassDBNotch);

}
```

0050

```
// MainPage.cpp : implementation file
//

#include "stdafx.h"
#include "sa.h"
#include "MainPage.h"

#include "TabDialog.h"
#include "DSP56kManager.h"
#include <stdlib.h>

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CMainPage property page

IMPLEMENT_DYNCREATE(CMainPage, CPropertyPage)

CMainPage::CMainPage() : CPropertyPage(CMainPage::IDD)
{

  //{{AFX_DATA_INIT(CMainPage)
  m_BypassCheckBox = FALSE;
  m_HDCDBypass = FALSE;
  m_GainScaleBypass = FALSE;
  m_AnalogInput = FALSE;
  //}}AFX_DATA_INIT

}

CMainPage::~CMainPage()
{
}

void CMainPage::DoDataExchange(CDataExchange* pDX)
{
  CPropertyPage::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CMainPage)
  DDX_Control(pDX, IDC_SLIDER8, m_Delay);
  DDX_Control(pDX, IDC_SLIDER7, m_AnalogVol);
  DDX_Control(pDX, IDC_BUTTON1, m_ResetAll);
  DDX_Control(pDX, IDC_SLIDER3, m_PreVolumeSlider);
  DDX_Control(pDX, IDC_SLIDER1, m_VolumeSlider);
  DDX_Check(pDX, IDC_CHECK1, m_BypassCheckBox);
  DDX_Check(pDX, IDC_CHECK2, m_HDCDBypass);
  DDX_Check(pDX, IDC_CHECK3, m_GainScaleBypass);
  DDX_Check(pDX, IDC_CHECK4, m_AnalogInput);
  //}}AFX_DATA_MAP
}


BEGIN_MESSAGE_MAP(CMainPage, CPropertyPage)
  //{{AFX_MSG_MAP(CMainPage)
  ON_WM_VSCROLL()
  ON_WM_SHOWWINDOW()
  ON_BN_CLICKED(IDC_CHECK1, OnBypassButton)
  ON_WM_PAINT()
  ON_BN_CLICKED(IDC_CHECK2, OnHDCDBypass)
  ON_BN_CLICKED(IDC_CHECK3, OnGainScaleBypass)
  ON_BN_CLICKED(IDC_BUTTON1, OnResetAll)
  ON_BN_CLICKED(IDC_CHECK4, OnAnalogInput)
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CMainPage message handlers

void CMainPage::OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar)
```

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```
{
  // TODO: Add your message handler code here and/or call default
  CSliderCtrl *slider = (CSliderCtrl *)pScrollBar;
  int which;

  CPropertyPage::OnVScroll(nSBCode, nPos, pScrollBar);

  Sleep(50);
  if ( slider == &m_VolumeSlider)
    which = kMainVolume;
  else if (slider == &m_PreVolumeSlider)
    which = kPreVolume;
  else if (slider == &m_AnalogVol)
    which = kAnalogVolume;
  else if (slider == &m_Delay)
    which = kDelay;
  else
    return;
  g_DSPManager->SetParamValue(CONTROL_RANGE-slider->GetPos(),which);
  SendStringToUI(which);

}

BOOL CMainPage::OnInitDialog()
{
  CPropertyPage::OnInitDialog();

  // TODO: Add extra initialization here
  m_VolumeSlider.SetRange(0,CONTROL_RANGE);
  m_VolumeSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kMainVolume));
  m_VolumeSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_VolumeSlider.SetPageSize(PG_CONTROL_AMT);

  m_PreVolumeSlider.SetRange(0,CONTROL_RANGE);
  m_PreVolumeSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kPreVolume));
  m_PreVolumeSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_PreVolumeSlider.SetPageSize(PG_CONTROL_AMT);

  m_AnalogVol.SetRange(0,CONTROL_RANGE);
  m_AnalogVol.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kAnalogVolume));
  m_AnalogVol.SetTicFreq((CONTROL_RANGE+1)/16);
  m_AnalogVol.SetPageSize(PG_CONTROL_AMT);

  m_Delay.SetRange(0,CONTROL_RANGE);
  m_Delay.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kAnalogVolume));
  m_Delay.SetTicFreq((CONTROL_RANGE+1)/16);
  m_Delay.SetPageSize(PG_CONTROL_AMT);

  m_BypassCheckBox = false;
  m_ParentWindow = (CTabDialog *) GetParent()->GetParent();

  return TRUE;  // return TRUE unless you set the focus to a control
                // EXCEPTION: OCX Property Pages should return FALSE
}

void CMainPage::OnShowWindow(BOOL bShow, UINT nStatus)
{
  CPropertyPage::OnShowWindow(bShow, nStatus);

  // TODO: Add your message handler code here

}

void CMainPage::OnBypassButton()
{
  // TODO: Add your control notification handler code here
  m_BypassCheckBox = !m_BypassCheckBox;
  g_DSPManager->SetBypass(m_BypassCheckBox);

}

void CMainPage::OnPaint()
```

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```
{
  CPaintDC dc(this); // device context for painting

  // TODO: Add your message handler code here
  m_VolumeSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kMainVolume));
  m_PreVolumeSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kPreVolume));
  m_AnalogVol.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kAnalogVolume));
  m_Delay.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kDelay));

  // Do not call CPropertyPage::OnPaint() for painting messages
}

void CMainPage::OnHDCDBypass()
{
  // TODO: Add your control notification handler code here
  m_HDCDBypass = !m_HDCDBypass;
  g_DSPManager->SetHDCDBypass(m_HDCDBypass);

}

void CMainPage::OnGainScaleBypass()
{
  // TODO: Add your control notification handler code here
  m_GainScaleBypass = !m_GainScaleBypass;
  g_DSPManager->SetHDCDGainScale(m_GainScaleBypass);

}

void CMainPage::OnResetAll()
{
  // TODO: Add your control notification handler code here

  // MM 8/3/99 Added extra dialog warning.
  if( MessageBox("Are you sure you want to reset all parameters?","WARNING",MB_YESNO) != IDYES )
    return;
  g_DSPManager->ResetAll();
  m_VolumeSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kMainVolume));
  m_PreVolumeSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kPreVolume));
  m_AnalogVol.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kAnalogVolume));
  m_Delay.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kDelay));

}

void CMainPage::OnAnalogInput()
{
  // TODO: Add your control notification handler code here
  m_AnalogInput = !m_AnalogInput;
  g_DSPManager->SetAnalogInput(m_AnalogInput);

}

void CMainPage::SendStringToUI(int which)
{

    CString str;

    g_DSPManager->GetStringValue(which,str);
    m_ParentWindow->SetStatusString(0,str);

}
```

```
#if !defined(AFX_MAINPAGE_H__90463DA4_D52E_11D2_96EE_006097CDB9E2__INCLUDED_)
#define AFX_MAINPAGE_H__90463DA4_D52E_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif

// _MSC_VER >= 1000
// MainPage.h : header file
//


class CTabDialog;

/////////////////////////////////////////////////////////////////////////////
// CMainPage dialog

class CMainPage : public CPropertyPage
{
  DECLARE_DYNCREATE(CMainPage)

// Construction
public:
  CMainPage();
  ~CMainPage();

// Dialog Data
  //{{AFX_DATA(CMainPage)
  enum { IDD = IDD_PP2 };
  CSliderCtrl m_Delay;
  CSliderCtrl m_AnalogVol;
  CButton m_ResetAll;
  CSliderCtrl m_PreVolumeSlider;
  CSliderCtrl m_VolumeSlider;
  BOOL  m_BypassCheckBox;
  BOOL  m_HDCDBypass;
  BOOL  m_GainScaleBypass;
  BOOL  m_AnalogInput;
  //}}AFX_DATA


// Overrides
  // ClassWizard generate virtual function overrides
  //{{AFX_VIRTUAL(CMainPage)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:
  // Generated message map functions
  //{{AFX_MSG(CMainPage)
  afx_msg void OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar);
  virtual BOOL OnInitDialog();
  afx_msg void OnShowWindow(BOOL bShow, UINT nStatus);
  afx_msg void OnBypassButton();
  afx_msg void OnPaint();
  afx_msg void OnHDCDBypass();
  afx_msg void OnGainScaleBypass();
  afx_msg void OnResetAll();
  afx_msg void OnAnalogInput();
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()

  CTabDialog *m_ParentWindow;
  void SendStringToUI(int which);

private:

};

//{{AFX_INSERT_LOCATION}}
```

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```
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_MAINPAGE_H__90463DA4_D52E_11D2_96EE_006097CDB9E2__INCLUDED_)
```

```
// I2CIPortComm.h: interface for the I2CIPortComm class.
//
//////////////////////////////////////////////////////////////////////

#if !defined(AFX_I2CIPORTCOMM_H__33F9EF07_F6EF_11D2_96EE_006097CDB9E2__INCLUDED_)
#define AFX_I2CIPORTCOMM_H__33F9EF07_F6EF_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000

#include "DSPComm.h"


enum {
  MI2C_STATE_CLOSED,
  MI2C_STATE_PENDING_OPEN,
  MI2C_STATE_OPEN,
  MI2C_STATE_PENDING_TX,
  MI2C_STATE_PENDING_RX
};

#define MI2_BUFFER_SIZE (3*3000)      // should be multiple of 3

class I2CIPortComm : public DSPComm
{
  int   m_state;
  int   m_error_code;
  long  m_TxReq;
  char  m_tx_buffer[MI2_BUFFER_SIZE];
  long  m_tx_write,m_tx_read;
  long  m_detect;
  BOOL  m_get_detect;
  long  m_retryCount;
  BOOL  m_initialTry;
  HWND  m_HWnd;

public:
  virtual BOOL IsTransmitting(void);
  virtual long GetDetectState(void);
  virtual void MessageHandler(WPARAM iPortEventCode);
  virtual BOOL CheckState(void);
  I2CIPortComm(HWND p);
  virtual ~I2CIPortComm();
  virtual long SendDSPWord(long);
  virtual long SendDSPMemory(char *,long);


};

#endif // !defined(AFX_I2CIPORTCOMM_H__33F9EF07_F6EF_11D2_96EE_006097CDB9E2__INCLUDED_)
```

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```
// I2CIPortComm.cpp: implementation of the I2CIPortComm class.
//
//////////////////////////////////////////////////////////////////////

#include "stdafx.h"
#include "sa.h"
#include "I2CIPortComm.h"
#include "COMPortChooser.h"

#include "i2c200.h"

static struct I2C_PROP i2c;
static I2CIPortComm *g_I2CComm = NULL;

#define I2C_SLAVE_ADDRESS 0xB0
#define I2C_MAX_AMOUNT  (5*3)      // don't send more than this in one-shot
#define I2C_RETRY_COUNT 0

#ifdef _DEBUG
#undef THIS_FILE
static char THIS_FILE[]=__FILE__;
#define new DEBUG_NEW
#endif

//static int cb_message;

void iPortMsgHandler(WPARAM iPortEventCode)
{

  if( g_I2CComm )
    g_I2CComm->MessageHandler(iPortEventCode);

}


//////////////////////////////////////////////////////////////////////
// Construction/Destruction
//////////////////////////////////////////////////////////////////////
/*static BOOL wait_for_message(void)
{

  long count;

  while( cb_message == -1 )
  {
    Sleep(100);
    count++;
    if( count > 20 )
      return( false );
  }
  return( true );

}*/

I2CIPortComm::I2CIPortComm(HWND p)
{

  int r;
  CCOMPortChooser dlg;

  dlg.DoModal();

  m_error_code = 0;
  m_state = MI2C_STATE_CLOSED;
  m_TxReq = 0;
  m_tx_write = m_tx_read = 0;
  m_detect = 0;
  m_get_detect = false;
  m_initialTry = false;
  m_HWnd = p;

  i2c.comport = dlg.which_port;
```

```
  i2c.WmMsgNo = 0;
  i2c.pfCBF = iPortMsgHandler;
#ifdef  NDEBUG
  i2c.pcLogFileName = NULL;
#else
  i2c.pcLogFileName = "log.txt";
#endif
  i2c.LogFileLevel = 1;
  i2c.LogFileSize = 1000;
  i2c.HostSlaveAddr = 0x6E;
  i2c.BusTimeOut = 1000;
  i2c.MasterBitRate = 2;       // 100 kHz
  i2c.MasterRxBufSize = 512;
  i2c.MasterTxBufSize = MI2_BUFFER_SIZE;
  i2c.MasterArbRetry = 0;
  i2c.SlaveRxGCEnable = 1;
  i2c.SlaveRxBufSize = 512;
  i2c.SlaveTxBufSize = 512;

  r = I2COpen(m_HWnd,AfxGetInstanceHandle(),&i2c);
  if( r )
      m_error_code = 0x1000;
  m_state = MI2C_STATE_PENDING_OPEN;
  g_I2CComm = this;

}

I2CIPortComm::~I2CIPortComm()
{

  I2CClose();
  g_I2CComm = NULL;

}

long I2CIPortComm::SendDSPWord(long value)
{

  char  buffer[3];

  if( m_state < MI2C_STATE_OPEN )
    return( 0L );

  buffer[0] = (value >> 16) & 0xFF;
  buffer[1] = (value >> 8) & 0xFF;
  buffer[2] = value & 0xFF;
  return( SendDSPMemory(buffer,3) );

}

long I2CIPortComm::SendDSPMemory(char *data, long len)
{

  // make sure the link is valid
  if( m_state < MI2C_STATE_OPEN )
    return( 0L );

  long rval = 0L;
  long b;
  long tocopy,amount,freespace;

  // copy data into the tx buffer
  if( data )
  {
    freespace = m_tx_read - m_tx_write;
    if( freespace  <= 0 )
      freespace += MI2_BUFFER_SIZE;
    ASSERT( (len + 3) <= freespace );       // not enough space in the buffer
    for( tocopy = len ; tocopy > 0 ; tocopy -= amount )
    {
        if( m_tx_write >= m_tx_read )
        {
```

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```
            amount = MI2_BUFFER_SIZE - m_tx_write;
          }
          else
          {
            amount = m_tx_read - m_tx_write;
          }
          amount = min(amount,tocopy);
          memcpy(m_tx_buffer+m_tx_write,data,amount);
          data += amount;
          m_tx_write += amount;
          m_tx_write %= MI2_BUFFER_SIZE;
      }
    }
    // attempt to send it
    if( m_state == MI2C_STATE_OPEN )
    {
      amount = m_tx_write - m_tx_read;
//    ASSERT( amount == ((amount / 3) * 3) );
      if( amount < 0 )
        amount = MI2_BUFFER_SIZE - m_tx_read;
//    amount = (amount / 3) * 3;       // Send complete DSP Words.
      amount = min(amount,I2C_MAX_AMOUNT);        // throttle
      b = I2CMasterTx(I2C_SLAVE_ADDRESS, (unsigned char *) m_tx_buffer+m_tx_read , amount, 1);
      if( b == 0 )
        {
          m_state = MI2C_STATE_PENDING_TX;
          m_TxReq = amount;
          if( !m_initialTry )
          {
            m_retryCount = 0;
            m_initialTry = true;
          }
        }
      else
      {
        if( m_error_code == 0 )
          m_error_code = b;
        ASSERT(b == 0);
      }
    }
    return( rval );

}

void I2CIPortComm::MessageHandler(WPARAM iPortEventCode)
{

    struct I2C_PROP si2c;
    int r;
    long tx_count;
    long val;
    unsigned char buffer[10];

    switch( m_state )
      {
        case MI2C_STATE_PENDING_OPEN:
          if( iPortEventCode == I2C_OPEN_SUCCESSFUL )
          {
            m_state = MI2C_STATE_OPEN;
            if( m_tx_read != m_tx_write )
              SendDSPMemory(NULL,0L);
          }
          else
            m_error_code = iPortEventCode;

          break;

        case MI2C_STATE_PENDING_RX:
          if( iPortEventCode == I2C_MRX_COMPLETE )
          {
            r = I2CGetMasterRxMsg(3,buffer);
            if( r == 3 )
```

```
        {
          val = buffer[0] & 0xFF;
          val << 8;
          val = val | (buffer[1] & 0xFF);
          val << 8;
          val = val | (buffer[2] & 0xFF);
          m_detect = val;
        }
      }
      //else
      //  m_error_code = iPortEventCode;
      m_state = MI2C_STATE_OPEN;
      if( m_tx_read != m_tx_write )
        SendDSPMemory(NULL,0L);
      break;

    case MI2C_STATE_PENDING_TX:
      if( iPortEventCode == I2C_MTX_COMPLETE )
      {
        // MM 5/20/99 Don't call status here.
//        r = I2CGetStatus(&si2c);
//        tx_count = si2c.MasterTxByteCount;
        tx_count = m_TxReq;
        m_initialTry = false;
      }
      else
      {
        m_retryCount++;
        if( m_retryCount > I2C_RETRY_COUNT )
        {
          m_initialTry = false;
          if( m_error_code == 0 )
            m_error_code = iPortEventCode;
          //ASSERT(m_retryCount <= I2C_RETRY_COUNT);
          I2CClose();
          r = I2COpen(m_HWnd,AfxGetInstanceHandle(),&i2c);
          ASSERT( r == 0 );
          m_state = MI2C_STATE_PENDING_OPEN;
          return;
        }
        tx_count = 0;
      }
      m_state = MI2C_STATE_OPEN;
      m_tx_read += tx_count;
      m_tx_read %= MI2_BUFFER_SIZE;
      if( m_get_detect )
      {
        m_get_detect = false;
        r = I2CMasterRxExt(I2C_SLAVE_ADDRESS,3,1,1);
        if( r )
        {
          if( m_error_code == 0 )
            m_error_code = r;
        }
        else
          m_state = MI2C_STATE_PENDING_RX;
      }
      else if( m_tx_read != m_tx_write )
        SendDSPMemory(NULL,0L);
      break;

/*      case MI2C_STATE_PENDING_TX:
      if( iPortEventCode == I2C_MTX_COMPLETE )
      {
        r = I2CGetStatus(&si2c);
        if( m_TxReq == si2c.MasterTxByteCount )
        {
            m_state = MI2C_STATE_OPEN;
            m_tx_read += m_TxReq;
            m_tx_read %= MI2_BUFFER_SIZE;
            if( m_tx_read != m_tx_write )
              SendDSPMemory(NULL,0L);
```

0060

```
        }
      }
      else
      {
        m_error_code = iPortEventCode;
        ;m_tx_read = m_tx_write = 0;
        m_state = MI2C_STATE_OPEN;
        if( m_tx_read != m_tx_write )
          SendDSPMemory(NULL,0L);
      }
      break; */
  }


}

BOOL I2CIPortComm::CheckState()
{

  return( m_state == MI2C_STATE_OPEN );

}

long I2CIPortComm::GetDetectState()
{

  long r,rval = 0;

  if( m_error_code )
  {
      rval = -m_error_code;
      m_error_code = 0;
  }
  else
  {
    rval = ( m_detect ) ? 1 : 0;
  }

  /*if( m_state == MI2C_STATE_PENDING_TX )
    m_get_detect = true;
  else if( m_state == MI2C_STATE_OPEN )
  {
    r = I2CMasterRxExt(I2C_SLAVE_ADDRESS,3,1,1);
    if( r )
      m_error_code = r;
    else
      m_state = MI2C_STATE_PENDING_RX;
  }*/
  return( rval );

}

BOOL I2CIPortComm::IsTransmitting()
{

  return( m_tx_write != m_tx_read );

}
```

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```
#if !defined(AFX_I2CDIALOG_H__B5D510E6_F7D5_11D2_96EE_006097CDB9E2__INCLUDED_)
#define AFX_I2CDIALOG_H__B5D510E6_F7D5_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000
// I2CDialog.h : header file
//

/////////////////////////////////////////////////////////////////////////////
// CI2CDialog dialog

class CI2CDialog : public CDialog
{

    UINT            m_timerID;
    int             m_state;

// Construction
public:
  CI2CDialog(CWnd* pParent = NULL);   // standard constructor

// Dialog Data
  //{{AFX_DATA(CI2CDialog)
  enum { IDD = IDD_DIALOG2 };
    // NOTE: the ClassWizard will add data members here
  //}}AFX_DATA


// Overrides
  // ClassWizard generated virtual function overrides
  //{{AFX_VIRTUAL(CI2CDialog)
  public:
  virtual BOOL OnCmdMsg(UINT nID, int nCode, void* pExtra, AFX_CMDHANDLERINFO* pHandlerInfo);
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:

  // Generated message map functions
  //{{AFX_MSG(CI2CDialog)
  virtual BOOL OnInitDialog();
  afx_msg void OnTimer(UINT nIDEvent);
  afx_msg void OnClose();
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()
};

//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_I2CDIALOG_H__B5D510E6_F7D5_11D2_96EE_006097CDB9E2__INCLUDED_)
```

```
// I2CDialog.cpp : implementation file
//

#include "stdafx.h"
#include "sa.h"
#include "I2CDialog.h"
#include "DSP56kManager.h"

#define TIMERID 55

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CI2CDialog dialog


CI2CDialog::CI2CDialog(CWnd* pParent /*=NULL*/)
  : CDialog(CI2CDialog::IDD, pParent)
{
  //{{AFX_DATA_INIT(CI2CDialog)
    // NOTE: the ClassWizard will add member initialization here
  //}}AFX_DATA_INIT
}


void CI2CDialog::DoDataExchange(CDataExchange* pDX)
{
  CDialog::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CI2CDialog)
    // NOTE: the ClassWizard will add DDX and DDV calls here
  //}}AFX_DATA_MAP
}


BEGIN_MESSAGE_MAP(CI2CDialog, CDialog)
  //{{AFX_MSG_MAP(CI2CDialog)
  ON_WM_TIMER()
  ON_WM_CLOSE()
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CI2CDialog message handlers


BOOL CI2CDialog::OnInitDialog()
{
  CDialog::OnInitDialog();

  // TODO: Add extra initialization here
  g_DSPManager = new CDSP56kManager(this->m_hWnd);

  m_timerID = 0;
  m_timerID = SetTimer(TIMERID,50,NULL);
  m_state = 0;

  return TRUE;  // return TRUE unless you set the focus to a control
                // EXCEPTION: OCX Property Pages should return FALSE
}

void CI2CDialog::OnTimer(UINT nIDEvent)
{
  // TODO: Add your message handler code here and/or call default
  if( nIDEvent == TIMERID )
    {
      if( g_DSPManager->IsReady() )
      {
          switch( m_state )
```

```
            {
            case 0:
              g_DSPManager->DownloadDSPCode();
              m_state++;
              break;
            case 1:
              g_DSPManager->ResetAll();
              EndDialog(IDOK);
              break;
            default:
              EndDialog(IDOK);
              break;
            }
        }
        else if( g_DSPManager->GetHDCDMode() < 0 )
          EndDialog(IDABORT);
      }
    else
      {
        CDialog::OnTimer(nIDEvent);
      }


}


BOOL CI2CDialog::OnCmdMsg(UINT nID, int nCode, void* pExtra, AFX_CMDHANDLERINFO* pHandlerInfo)
{
  // TODO: Add your specialized code here and/or call the base class

  return CDialog::OnCmdMsg(nID, nCode, pExtra, pHandlerInfo);
}

void CI2CDialog::OnClose()
{
  // TODO: Add your message handler code here and/or call default
  if( m_timerID )
    KillTimer( m_timerID );

  CDialog::OnClose();
}
```

```
#if !defined(AFX_I2CCOMMERRORDIALOG_H__76C389E8_F889_11D2_96EE_006097CDB9E2__INCLUDED_)
#define AFX_I2CCOMMERRORDIALOG_H__76C389E8_F889_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000
// I2CCommErrorDialog.h : header file
//

/////////////////////////////////////////////////////////////////////////////
// CI2CCommErrorDialog dialog

class CI2CCommErrorDialog : public CDialog
{
// Construction
public:
  CI2CCommErrorDialog(CWnd* pParent = NULL);   // standard constructor

// Dialog Data
  //{{AFX_DATA(CI2CCommErrorDialog)
  enum { IDD = IDD_DIALOG4 };
  CString m_ErrorCode;
  //}}AFX_DATA


// Overrides
  // ClassWizard generated virtual function overrides
  //{{AFX_VIRTUAL(CI2CCommErrorDialog)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:

  // Generated message map functions
  //{{AFX_MSG(CI2CCommErrorDialog)
  afx_msg void OnButton1();
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()
};

//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_I2CCOMMERRORDIALOG_H__76C389E8_F889_11D2_96EE_006097CDB9E2__INCLUDED_)
```

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```
// I2CCommErrorDialog.cpp : implementation file
//

#include "stdafx.h"
#include "sa.h"
#include "I2CCommErrorDialog.h"

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CI2CCommErrorDialog dialog


CI2CCommErrorDialog::CI2CCommErrorDialog(CWnd* pParent /*=NULL*/)
  : CDialog(CI2CCommErrorDialog::IDD, pParent)
{
  //{{AFX_DATA_INIT(CI2CCommErrorDialog)
  m_ErrorCode = _T("");
  //}}AFX_DATA_INIT
}


void CI2CCommErrorDialog::DoDataExchange(CDataExchange* pDX)
{
  CDialog::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CI2CCommErrorDialog)
  DDX_Text(pDX, IDC_EDIT1, m_ErrorCode);
  //}}AFX_DATA_MAP
}


BEGIN_MESSAGE_MAP(CI2CCommErrorDialog, CDialog)
  //{{AFX_MSG_MAP(CI2CCommErrorDialog)
  ON_BN_CLICKED(IDC_BUTTON1, OnButton1)
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CI2CCommErrorDialog message handlers

void CI2CCommErrorDialog::OnButton1()
{
  // TODO: Add your control notification handler code here
  EndDialog(IDCANCEL);

}
```

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```
// PEQParam.h: interface for the CPEQParam class.
//
//////////////////////////////////////////////////////////////////////

#if !defined(AFX_PEQPARAM_H__733FB7AB_4A49_11D3_96EE_006097CDB9E2__INCLUDED_)
#define AFX_PEQPARAM_H__733FB7AB_4A49_11D3_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000

typedef struct _biquadcoef
{

  float c[6];   // b0,b1,b2,a0,a1,a2

} biquadcoef;

class CPEQParam
{

  float   m_Gain;          // in dB (+ or -)
  float   m_Q;             // in Q units
  float   m_Frequency;     // in Hz
  float   m_SampleRate;    // in Hz
  double  m_pi;

public:
  void GetCoef(biquadcoef *);
  void GetAllpassCoef(biquadcoef *);
  void SetQ(float v) { m_Q = v; }
  void SetQ(CString &str);
  void SetGain(float v) { m_Gain = v; }
  void SetGain(CString &str);
  void SetFreq(float v) { m_Frequency = v; }
  void SetFreq(CString &str);

  CPEQParam();
  virtual ~CPEQParam();

};

#endif // !defined(AFX_PEQPARAM_H__733FB7AB_4A49_11D3_96EE_006097CDB9E2__INCLUDED_)
```

```
// PEQParam.cpp: implementation of the CPEQParam class.
//
//////////////////////////////////////////////////////////////////////

#include "stdafx.h"
#include "sa.h"
#include "PEQParam.h"
#include <stdio.h>
#include <math.h>

#ifdef _DEBUG
#undef THIS_FILE
static char THIS_FILE[]=__FILE__;
#define new DEBUG_NEW
#endif

//////////////////////////////////////////////////////////////////////
// Construction/Destruction
//////////////////////////////////////////////////////////////////////

CPEQParam::CPEQParam()
  : m_Frequency(0.5),m_Gain(0.0),m_Q(1.0),m_SampleRate(44100.)
{
    m_pi = acos(-1.);
}

CPEQParam::~CPEQParam()
{

}

void CPEQParam::SetGain(CString & str)
{
    float v;

    sscanf(str,"%f",&v);
    m_Gain = v;
}

void CPEQParam::SetFreq(CString & str)
{

    float v;

    sscanf(str,"%f",&v);
    m_Frequency = v;
}

void CPEQParam::SetQ(CString & str)
{

    float v;

    sscanf(str,"%f",&v);
    m_Q = v;
}


void CPEQParam::GetAllpassCoef(biquadcoef *f)
{

  double gamma,beta,wc,tbeta;
  double normFreq = m_Frequency/m_SampleRate;

  wc = m_pi*normFreq;
  gamma = -cos(wc);
  tbeta = wc/(2*m_Q);
  if( tbeta > m_pi/4 )
    tbeta = m_pi/4;
  beta = (1.-tan(tbeta))/(1.+tan(tbeta));

  f->c[0] = (float) beta;              // b0
```

```
  f->c[1] = (float) (ga      (1+beta)); // b1
  f->c[2] = 1.;                        // b2
  f->c[3] = 1.;                        // a0
  f->c[4] = f->c[1];                   // a1
  f->c[5] = (float) beta;              // a2

}

void CPEQParam::GetCoef(biquadcoef *f)
{

  double M,L;
  biquadcoef af;
  double gain = (float) pow(10.,m_Gain/20.);

  GetAllpassCoef(&af);
  M = (1.-gain)/2.;
  L = (1.+gain)/2.;

  f->c[0] = (float) (af.c[0]*M+L);              // b0
  f->c[1] = (float) (af.c[1]*M+af.c[4]*L);  // b1
  f->c[2] = (float) (af.c[2]*M+af.c[5]*L);  // b2
  f->c[3] = af.c[3];
  f->c[4] = af.c[4];
  f->c[5] = af.c[5];

}
```

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```
#if !defined(AFX_NOTCHPAGE2_H__5C8994C7_E2A4_11D2_96EE_006097CDB9E2__INCLUDED_)
#define AFX_NOTCHPAGE2_H__5C8994C7_E2A4_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000
// NotchPage2.h : header file
//

class CTabDialog;

/////////////////////////////////////////////////////////////////////////////
// CNotchPage2 dialog

class CNotchPage2 : public CPropertyPage
{
  DECLARE_DYNCREATE(CNotchPage2)

// Construction
public:
  CNotchPage2();
  ~CNotchPage2();

// Dialog Data
  //{{AFX_DATA(CNotchPage2)
  enum { IDD = IDD_PP9 };
  CButton m_BypassSecondButton;
  CButton m_BypassFirstButton;
  CSliderCtrl m_SliderCut4;
  CSliderCtrl m_SliderQ4;
  CSliderCtrl m_SliderFrequency4;
  CSliderCtrl m_SliderCut3;
  CSliderCtrl m_SliderQ3;
  CSliderCtrl m_SliderFrequency3;
  //}}AFX_DATA


// Overrides
  // ClassWizard generate virtual function overrides
  //{{AFX_VIRTUAL(CNotchPage2)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:
  // Generated message map functions
  //{{AFX_MSG(CNotchPage2)
  afx_msg void OnPaint();
  virtual BOOL OnInitDialog();
  afx_msg void OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar);
  afx_msg void OnBypassFirst();
  afx_msg void OnBypassSecond();
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()

  CTabDialog *m_ParentWindow;
  void SendStringToUI(int which);

};

//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_NOTCHPAGE2_H__5C8994C7_E2A4_11D2_96EE_006097CDB9E2__INCLUDED_)
```

```
// NotchPage2.cpp : implementation file
//

#include "stdafx.h"
#include "sa.h"
#include "NotchPage2.h"
#include "TabDialog.h"
#include "DSP56kManager.h"

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CNotchPage2 property page

IMPLEMENT_DYNCREATE(CNotchPage2, CPropertyPage)

CNotchPage2::CNotchPage2() : CPropertyPage(CNotchPage2::IDD)
{
  //{{AFX_DATA_INIT(CNotchPage2)
  //}}AFX_DATA_INIT
}

CNotchPage2::~CNotchPage2()
{
}

void CNotchPage2::DoDataExchange(CDataExchange* pDX)
{
  CPropertyPage::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CNotchPage2)
  DDX_Control(pDX, IDC_CHECK6, m_BypassSecondButton);
  DDX_Control(pDX, IDC_CHECK5, m_BypassFirstButton);
  DDX_Control(pDX, IDC_SLIDER6, m_SliderCut4);
  DDX_Control(pDX, IDC_SLIDER5, m_SliderQ4);
  DDX_Control(pDX, IDC_SLIDER4, m_SliderFrequency4);
  DDX_Control(pDX, IDC_SLIDER3, m_SliderCut3);
  DDX_Control(pDX, IDC_SLIDER2, m_SliderQ3);
  DDX_Control(pDX, IDC_SLIDER1, m_SliderFrequency3);
  //}}AFX_DATA_MAP
}


BEGIN_MESSAGE_MAP(CNotchPage2, CPropertyPage)
  //{{AFX_MSG_MAP(CNotchPage2)
  ON_WM_PAINT()
  ON_WM_VSCROLL()
  ON_BN_CLICKED(IDC_CHECK5, OnBypassFirst)
  ON_BN_CLICKED(IDC_CHECK6, OnBypassSecond)
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CNotchPage2 message handlers

void CNotchPage2::OnPaint()
{
  CPaintDC dc(this); // device context for painting

  // TODO: Add your message handler code here
  m_SliderFrequency3.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch6Freq));
  m_SliderQ3.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch6Q));
  m_SliderCut3.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch6Cut));
  m_SliderFrequency4.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch7Freq));
  m_SliderQ4.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch7Q));
  m_SliderCut4.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch7Cut));

  m_BypassFirstButton.SetCheck(g_DSPManager->GetBypassSection(kBypassNotch3));
  m_BypassSecondButton.SetCheck(g_DSPManager->GetBypassSection(kBypassNotch4));
```

```
    // Do not call CPropertyPage::OnPaint() for painting messages
}

BOOL CNotchPage2::OnInitDialog()
{
    CPropertyPage::OnInitDialog();

    // TODO: Add extra initialization here
    m_SliderFrequency3.SetRange(0,CONTROL_RANGE);
    m_SliderFrequency3.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch6Freq));
    m_SliderFrequency3.SetTicFreq((CONTROL_RANGE+1)/16);
    m_SliderFrequency3.SetPageSize(PG_CONTROL_AMT);

    m_SliderQ3.SetRange(0,CONTROL_RANGE);
    m_SliderQ3.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch6Q));
    m_SliderQ3.SetTicFreq((CONTROL_RANGE+1)/16);
    m_SliderQ3.SetPageSize(PG_CONTROL_AMT);

    m_SliderCut3.SetRange(0,CONTROL_RANGE);
    m_SliderCut3.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch6Cut));
    m_SliderCut3.SetTicFreq((CONTROL_RANGE+1)/16);
    m_SliderCut3.SetPageSize(PG_CONTROL_AMT);

    m_SliderFrequency4.SetRange(0,CONTROL_RANGE);
    m_SliderFrequency4.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch7Freq));
    m_SliderFrequency4.SetTicFreq((CONTROL_RANGE+1)/16);
    m_SliderFrequency4.SetPageSize(PG_CONTROL_AMT);

    m_SliderQ4.SetRange(0,CONTROL_RANGE);
    m_SliderQ4.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch7Q));
    m_SliderQ4.SetTicFreq((CONTROL_RANGE+1)/16);
    m_SliderQ4.SetPageSize(PG_CONTROL_AMT);

    m_SliderCut4.SetRange(0,CONTROL_RANGE);
    m_SliderCut4.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch7Cut));
    m_SliderCut4.SetTicFreq((CONTROL_RANGE+1)/16);
    m_SliderCut4.SetPageSize(PG_CONTROL_AMT);

    m_ParentWindow = (CTabDialog *) GetParent()->GetParent();

    return TRUE;  // return TRUE unless you set the focus to a control
                  // EXCEPTION: OCX Property Pages should return FALSE
}

void CNotchPage2::OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar)
{
    // TODO: Add your message handler code here and/or call default
    CSliderCtrl *slider = (CSliderCtrl *)pScrollBar;
    int which;

    CPropertyPage::OnVScroll(nSBCode, nPos, pScrollBar);

    Sleep(50);
    if( slider == &m_SliderFrequency3 )
      which = kNotch6Freq;
    else if( slider == &m_SliderQ3 )
      which = kNotch6Q;
    else if( slider == &m_SliderCut3 )
      which = kNotch6Cut;
    else if( slider == &m_SliderFrequency4 )
      which = kNotch7Freq;
    else if( slider == &m_SliderQ4 )
      which = kNotch7Q;
    else if( slider == &m_SliderCut4 )
      which = kNotch7Cut;
    else
      return;

    g_DSPManager->SetParamValue(CONTROL_RANGE-slider->GetPos(),which);
    SendStringToUI(which);

}
```

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```
void CNotchPage2::SendStringToUI(int which)
{

    CString str;

    g_DSPManager->GetStringValue(which,str);
    m_ParentWindow->SetStatusString(0,str);

}

void CNotchPage2::OnBypassFirst()
{
  // TODO: Add your control notification handler code here
  int state = m_BypassFirstButton.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassNotch3);

}

void CNotchPage2::OnBypassSecond()
{
  // TODO: Add your control notification handler code here
  int state = m_BypassSecondButton.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassNotch4);

}
```

```
#if !defined(AFX_NOTCHPAGE1_H__0CF7E208_D790_11D2_96EE_006097CDB9E2__INCLUDED_)
#define AFX_NOTCHPAGE1_H__0CF7E208_D790_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000
// NotchPage1.h : header file
//

/////////////////////////////////////////////////////////////////////////////
// CNotchPage1 dialog

class CTabDialog;

class CNotchPage1 : public CPropertyPage
{
  DECLARE_DYNCREATE(CNotchPage1)

// Construction
public:
  CNotchPage1();
  ~CNotchPage1();

// Dialog Data
  //{{AFX_DATA(CNotchPage1)
  enum { IDD = IDD_PP4 };
  CButton m_BypassSecondButton;
  CButton m_BypassFirstButton;
  CSliderCtrl m_SliderCut2;
  CSliderCtrl m_SliderQ2;
  CSliderCtrl m_SliderFrequency2;
  CSliderCtrl m_SliderCut1;
  CSliderCtrl m_SliderQ1;
  CSliderCtrl m_SliderFrequency1;
  //}}AFX_DATA


// Overrides
  // ClassWizard generate virtual function overrides
  //{{AFX_VIRTUAL(CNotchPage1)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:
  // Generated message map functions
  //{{AFX_MSG(CNotchPage1)
  virtual BOOL OnInitDialog();
  afx_msg void OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar);
  afx_msg void OnShowWindow(BOOL bShow, UINT nStatus);
  afx_msg void OnPaint();
  afx_msg void OnBypassFirst();
  afx_msg void OnBypassSecond();
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()

  CTabDialog *m_ParentWindow;
  void SendStringToUI(int which);

};

//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_NOTCHPAGE1_H__0CF7E208_D790_11D2_96EE_006097CDB9E2__INCLUDED_)
```

```
// NotchPage1.cpp : implementation file
//

#include "stdafx.h"
#include "sa.h"
#include "NotchPage1.h"
#include "TabDialog.h"
#include "DSP56kManager.h"

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CNotchPage1 property page

IMPLEMENT_DYNCREATE(CNotchPage1, CPropertyPage)

CNotchPage1::CNotchPage1() : CPropertyPage(CNotchPage1::IDD)
{
  //{{AFX_DATA_INIT(CNotchPage1)
  //}}AFX_DATA_INIT
}

CNotchPage1::~CNotchPage1()
{
}

void CNotchPage1::DoDataExchange(CDataExchange* pDX)
{
  CPropertyPage::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CNotchPage1)
  DDX_Control(pDX, IDC_CHECK6, m_BypassSecondButton);
  DDX_Control(pDX, IDC_CHECK5, m_BypassFirstButton);
  DDX_Control(pDX, IDC_SLIDER6, m_SliderCut2);
  DDX_Control(pDX, IDC_SLIDER5, m_SliderQ2);
  DDX_Control(pDX, IDC_SLIDER4, m_SliderFrequency2);
  DDX_Control(pDX, IDC_SLIDER3, m_SliderCut1);
  DDX_Control(pDX, IDC_SLIDER2, m_SliderQ1);
  DDX_Control(pDX, IDC_SLIDER1, m_SliderFrequency1);
  //}}AFX_DATA_MAP
}


BEGIN_MESSAGE_MAP(CNotchPage1, CPropertyPage)
  //{{AFX_MSG_MAP(CNotchPage1)
  ON_WM_VSCROLL()
  ON_WM_SHOWWINDOW()
  ON_WM_PAINT()
  ON_BN_CLICKED(IDC_CHECK5, OnBypassFirst)
  ON_BN_CLICKED(IDC_CHECK6, OnBypassSecond)
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CNotchPage1 message handlers

BOOL CNotchPage1::OnInitDialog()
{
  CPropertyPage::OnInitDialog();

  // TODO: Add extra initialization here
  m_SliderFrequency1.SetRange(0,CONTROL_RANGE);
  m_SliderFrequency1.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch1Freq));
  m_SliderFrequency1.SetTicFreq((CONTROL_RANGE+1)/16);
  m_SliderFrequency1.SetPageSize(PG_CONTROL_AMT);

  m_SliderQ1.SetRange(0,CONTROL_RANGE);
  m_SliderQ1.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch1Q));
  m_SliderQ1.SetTicFreq((CONTROL_RANGE+1)/16);
```

```
    m_SliderQ1.SetPageSize(PG_CONTROL_AMT);

    m_SliderCut1.SetRange(0,CONTROL_RANGE);
    m_SliderCut1.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch1Cut));
    m_SliderCut1.SetTicFreq((CONTROL_RANGE+1)/16);
    m_SliderCut1.SetPageSize(PG_CONTROL_AMT);

    m_SliderFrequency2.SetRange(0,CONTROL_RANGE);
    m_SliderFrequency2.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch2Freq));
    m_SliderFrequency2.SetTicFreq((CONTROL_RANGE+1)/16);
    m_SliderFrequency2.SetPageSize(PG_CONTROL_AMT);

    m_SliderQ2.SetRange(0,CONTROL_RANGE);
    m_SliderQ2.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch2Q));
    m_SliderQ2.SetTicFreq((CONTROL_RANGE+1)/16);
    m_SliderQ2.SetPageSize(PG_CONTROL_AMT);

    m_SliderCut2.SetRange(0,CONTROL_RANGE);
    m_SliderCut2.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch2Cut));
    m_SliderCut2.SetTicFreq((CONTROL_RANGE+1)/16);
    m_SliderCut2.SetPageSize(PG_CONTROL_AMT);

    m_ParentWindow = (CTabDialog *) GetParent()->GetParent();

    return TRUE;  // return TRUE unless you set the focus to a control
                  // EXCEPTION: OCX Property Pages should return FALSE
}

void CNotchPage1::OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar)
{
    // TODO: Add your message handler code here and/or call default
    CSliderCtrl *slider = (CSliderCtrl *)pScrollBar;
    int which;

    CPropertyPage::OnVScroll(nSBCode, nPos, pScrollBar);

    Sleep(50);
    if( slider == &m_SliderFrequency1 )
      which = kNotch1Freq;
    else if( slider == &m_SliderQ1 )
      which = kNotch1Q;
    else if( slider == &m_SliderCut1 )
      which = kNotch1Cut;
    else if( slider == &m_SliderFrequency2 )
      which = kNotch2Freq;
    else if( slider == &m_SliderQ2 )
      which = kNotch2Q;
    else if( slider == &m_SliderCut2 )
      which = kNotch2Cut;
    else
      return;
    g_DSPManager->SetParamValue(CONTROL_RANGE-slider->GetPos(),which);
    SendStringToUI(which);

}

void CNotchPage1::OnShowWindow(BOOL bShow, UINT nStatus)
{
    CPropertyPage::OnShowWindow(bShow, nStatus);

    // TODO: Add your message handler code here

}

void CNotchPage1::OnPaint()
{
    CPaintDC dc(this); // device context for painting

    // TODO: Add your message handler code here
    m_SliderFrequency1.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch1Freq));
    m_SliderQ1.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch1Q));
    m_SliderCut1.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch1Cut));
```

```
  m_SliderFrequency2.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch2Freq));
  m_SliderQ2.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch2Q));
  m_SliderCut2.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch2Cut));
  m_BypassFirstButton.SetCheck(g_DSPManager->GetBypassSection(kBypassNotch1));
  m_BypassSecondButton.SetCheck(g_DSPManager->GetBypassSection(kBypassNotch2));

  // Do not call CPropertyPage::OnPaint() for painting messages
}

void CNotchPage1::SendStringToUI(int which)
{

    CString str;

    g_DSPManager->GetStringValue(which,str);
    m_ParentWindow->SetStatusString(0,str);

}

void CNotchPage1::OnBypassFirst()
{
  // TODO: Add your control notification handler code here
  int state = m_BypassFirstButton.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassNotch1);

}

void CNotchPage1::OnBypassSecond()
{
  // TODO: Add your control notification handler code here
  int state = m_BypassSecondButton.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassNotch2);

}
```

```
#if !defined(AFX_NEWCUTOFFPAGE_H__E2728226_E026_11D2_96EE_006097CDB9E2__INCLUDED_)
#define AFX_NEWCUTOFFPAGE_H__E2728226_E026_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000
// NewCutoffPage.h : header file
//

class CTabDialog;

/////////////////////////////////////////////////////////////////////////////
// CNewCutoffPage dialog

class CNewCutoffPage : public CPropertyPage
{
  DECLARE_DYNCREATE(CNewCutoffPage)

// Construction
public:
  CNewCutoffPage();
  ~CNewCutoffPage();

// Dialog Data
  //{{AFX_DATA(CNewCutoffPage)
  enum { IDD = IDD_PP8 };
  CButton m_BypassNLopassButton;
  CSliderCtrl m_NewHiQSlider;
  CSliderCtrl m_NewHiFreqSlider;
  CButton m_BypassLopassButton;
  CButton m_BypassHipassButton;
  CSliderCtrl m_HiQSlider;
  CSliderCtrl m_HiFreqSlider;
  CSliderCtrl m_LoQSlider;
  CSliderCtrl m_LoFreqSlider;
  //}}AFX_DATA


// Overrides
  // ClassWizard generate virtual function overrides
  //{{AFX_VIRTUAL(CNewCutoffPage)
  public:
  virtual BOOL OnSetActive();
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:
  // Generated message map functions
  //{{AFX_MSG(CNewCutoffPage)
  afx_msg void OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar);
  virtual BOOL OnInitDialog();
  afx_msg void OnShowWindow(BOOL bShow, UINT nStatus);
  afx_msg void OnPaint();
  afx_msg void OnBypassHipass();
  afx_msg void OnBypassLopass();
  afx_msg void OnBypassNewLopass();
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()

  CTabDialog *m_ParentWindow;
  void SendStringToUI(int which);

};

//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_NEWCUTOFFPAGE_H__E2728226_E026_11D2_96EE_006097CDB9E2__INCLUDED_)
```

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```
// NewCutoffPage.cpp : implementation file
//

#include "stdafx.h"
#include "sa.h"
#include "NewCutoffPage.h"
#include "TabDialog.h"
#include "DSP56kManager.h"

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CNewCutoffPage property page

IMPLEMENT_DYNCREATE(CNewCutoffPage, CPropertyPage)

CNewCutoffPage::CNewCutoffPage() : CPropertyPage(CNewCutoffPage::IDD)
{
  //{{AFX_DATA_INIT(CNewCutoffPage)
  //}}AFX_DATA_INIT
}

CNewCutoffPage::~CNewCutoffPage()
{
}

void CNewCutoffPage::DoDataExchange(CDataExchange* pDX)
{
  CPropertyPage::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CNewCutoffPage)
  DDX_Control(pDX, IDC_CHECK7, m_BypassNLopassButton);
  DDX_Control(pDX, IDC_SLIDER9, m_NewHiQSlider);
  DDX_Control(pDX, IDC_SLIDER8, m_NewHiFreqSlider);
  DDX_Control(pDX, IDC_CHECK5, m_BypassLopassButton);
  DDX_Control(pDX, IDC_CHECK4, m_BypassHipassButton);
  DDX_Control(pDX, IDC_SLIDER5, m_HiQSlider);
  DDX_Control(pDX, IDC_SLIDER4, m_HiFreqSlider);
  DDX_Control(pDX, IDC_SLIDER2, m_LoQSlider);
  DDX_Control(pDX, IDC_SLIDER1, m_LoFreqSlider);
  //}}AFX_DATA_MAP
}


BEGIN_MESSAGE_MAP(CNewCutoffPage, CPropertyPage)
  //{{AFX_MSG_MAP(CNewCutoffPage)
  ON_WM_VSCROLL()
  ON_WM_SHOWWINDOW()
  ON_WM_PAINT()
  ON_BN_CLICKED(IDC_CHECK4, OnBypassHipass)
  ON_BN_CLICKED(IDC_CHECK5, OnBypassLopass)
  ON_BN_CLICKED(IDC_CHECK7, OnBypassNewLopass)
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CNewCutoffPage message handlers

void CNewCutoffPage::OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar)
{
  // TODO: Add your message handler code here and/or call default
  CSliderCtrl *slider = (CSliderCtrl *)pScrollBar;
  int which;

  CPropertyPage::OnVScroll(nSBCode, nPos, pScrollBar);

  Sleep(50);
  if( slider == &m_LoFreqSlider )
    which = kLoCutoffFreq;
```

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```
  else if( slider == &m_LoQSlider )
    which = kLoCutoffQ;
  else if( slider == &m_HiFreqSlider )
    which = kHiCutoffFreq;
  else if( slider == &m_HiQSlider )
    which = kHiCutoffQ;
  else if( slider == &m_NewHiFreqSlider )
    which = kHiCutoff2Freq;
  else if( slider == &m_NewHiQSlider )
    which = kHiCutoff2Q;
  else
    return;
  g_DSPManager->SetParamValue(CONTROL_RANGE-slider->GetPos(),which);
  SendStringToUI(which);

}

void CNewCutoffPage::SendStringToUI(int which)
{

    CString str;

    g_DSPManager->GetStringValue(which,str);
    m_ParentWindow->SetStatusString(0,str);

}

BOOL CNewCutoffPage::OnInitDialog()
{
  CPropertyPage::OnInitDialog();

  // TODO: Add extra initialization here
  m_LoFreqSlider.SetRange(0,CONTROL_RANGE);
  m_LoFreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kLoCutoffFreq));
  m_LoFreqSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_LoFreqSlider.SetPageSize(PG_CONTROL_AMT);

  m_LoQSlider.SetRange(0,CONTROL_RANGE);
  m_LoQSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kLoCutoffQ));
  m_LoQSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_LoQSlider.SetPageSize(PG_CONTROL_AMT);

  m_HiFreqSlider.SetRange(0,CONTROL_RANGE);
  m_HiFreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kHiCutoffFreq));
  m_HiFreqSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_HiFreqSlider.SetPageSize(PG_CONTROL_AMT);

  m_HiQSlider.SetRange(0,CONTROL_RANGE);
  m_HiQSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kHiCutoffQ));
  m_HiQSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_HiQSlider.SetPageSize(PG_CONTROL_AMT);

  m_NewHiFreqSlider.SetRange(0,CONTROL_RANGE);
  m_NewHiFreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kHiCutoff2Freq));
  m_NewHiFreqSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_NewHiFreqSlider.SetPageSize(PG_CONTROL_AMT);

  m_NewHiQSlider.SetRange(0,CONTROL_RANGE);
  m_NewHiQSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kHiCutoff2Q));
  m_NewHiQSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_NewHiQSlider.SetPageSize(PG_CONTROL_AMT);

  m_ParentWindow = (CTabDialog *) GetParent()->GetParent();

  return TRUE;  // return TRUE unless you set the focus to a control
                // EXCEPTION: OCX Property Pages should return FALSE
}

void CNewCutoffPage::OnShowWindow(BOOL bShow, UINT nStatus)
{
  CPropertyPage::OnShowWindow(bShow, nStatus);
```

0080

```
  // TODO: Add your message handler code here

}

BOOL CNewCutoffPage::OnSetActive()
{
  // TODO: Add your specialized code here and/or call the base class

  return CPropertyPage::OnSetActive();
}

void CNewCutoffPage::OnPaint()
{
  CPaintDC dc(this); // device context for painting

  // TODO: Add your message handler code here
  m_LoFreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kLoCutoffFreq));
  m_LoQSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kLoCutoffQ));
  m_HiFreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kHiCutoffFreq));
  m_HiQSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kHiCutoffQ));
  m_NewHiFreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kHiCutoff2Freq));
  m_NewHiQSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kHiCutoff2Q));

  m_BypassHipassButton.SetCheck(g_DSPManager->GetBypassSection(kBypassHipass));
  m_BypassLopassButton.SetCheck(g_DSPManager->GetBypassSection(kBypassLopass));
  m_BypassNLopassButton.SetCheck(g_DSPManager->GetBypassSection(kBypassNLopass));
  // Do not call CPropertyPage::OnPaint() for painting messages
}

void CNewCutoffPage::OnBypassHipass()
{
  // TODO: Add your control notification handler code here
  int state = m_BypassHipassButton.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassHipass);

}

void CNewCutoffPage::OnBypassLopass()
{
  // TODO: Add your control notification handler code here
  int state = m_BypassLopassButton.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassLopass);

}

void CNewCutoffPage::OnBypassNewLopass()
{
  // TODO: Add your control notification handler code here
  int state = m_BypassNLopassButton.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassNLopass);

}
```

0081

```
// ShelfEQParam.h: interface for the CShelfEQParam class.
//
//////////////////////////////////////////////////////////////////////

#if !defined(AFX_ShelfEQPARAM_H__733FB7AB_4A49_11D3_96EE_006097CDB9E2__INCLUDED_)
#define AFX_ShelfEQPARAM_H__733FB7AB_4A49_11D3_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000

typedef struct _biquadcoef
{

  float c[6];  // b0,b1,b2,a0,a1,a2

} biquadcoef;

class CShelfEQParam
{

  float   m_Gain;          // in dB (+ or -)
  float   m_Frequency;     // in Hz
  float   m_SampleRate;    // in Hz
  double  m_pi;
  bool    m_HiShelf;

public:
  void GetCoef(biquadcoef *);
  void GetAllpassCoef(biquadcoef *);
  void SetGain(float v) { m_Gain = v; }
  void SetGain(CString &str);
  void SetFreq(float v) { m_Frequency = v; }
  void SetFreq(CString &str);

  CShelfEQParam(bool hi);
  virtual ~CShelfEQParam();

};

#endif // !defined(AFX_ShelfEQPARAM_H__733FB7AB_4A49_11D3_96EE_006097CDB9E2__INCLUDED_)
```

```
// ShelfEQParam.cpp: implementation of the CShelfEQParam class.
//
//////////////////////////////////////////////////////////////////////

#include "stdafx.h"
#include "sa.h"
#include "ShelfEQParam.h"
#include <stdio.h>
#include <math.h>

#ifdef _DEBUG
#undef THIS_FILE
static char THIS_FILE[]=__FILE__;
#define new DEBUG_NEW
#endif

//////////////////////////////////////////////////////////////////////
// Construction/Destruction
//////////////////////////////////////////////////////////////////////

CShelfEQParam::CShelfEQParam(bool hi)
  : m_Frequency(0.5),m_Gain(0.0),m_SampleRate(44100.),m_HiShelf(hi)
{
    m_pi = acos(-1.);
}

CShelfEQParam::~CShelfEQParam()
{

}

void CShelfEQParam::SetGain(CString & str)
{
    float v;

    sscanf(str,"%f",&v);
    m_Gain = v;
}

void CShelfEQParam::SetFreq(CString & str)
{

    float v;

    sscanf(str,"%f",&v);
    m_Frequency = v;
}


void CShelfEQParam::GetAllpassCoef(biquadcoef *f)
{

  double gamma,wc;
  double normFreq = m_Frequency/m_SampleRate/2;

  wc = m_pi*normFreq;
  gamma = (tan(wc/2)-1)/(tan(wc/2)+1);

  if( m_HiShelf )
  {
    f->c[0] = (float) gamma;       // b0
    f->c[1] = 1.0;                 // b1
  }
  else
  {
    f->c[0] = (float) -gamma;      // b0
    f->c[1] = -1.0;                // b1
  }

  f->c[2] = 0;                        // b2
  f->c[3] = 1.;                       // a0
  f->c[4] = (float) gamma;            // a1
```

```
  f->c[5] = 0;                          // a2

}

void CShelfEQParam::GetCoef(biquadcoef *f)
{

  double M,L;
  biquadcoef af;
  double gain = (float) pow(10.,m_Gain/20.);

  GetAllpassCoef(&af);
  M = (1.-gain)/2.;
  L = (1.+gain)/2.;

  f->c[0] = (float) (af.c[0]*M+L);              // b0
  f->c[1] = (float) (af.c[1]*M+af.c[4]*L);  // b1
  f->c[2] = (float) (af.c[2]*M+af.c[5]*L);  // b2
  f->c[3] = af.c[3];
  f->c[4] = af.c[4];
  f->c[5] = af.c[5];

}
```

0084

```
// saDlg.h : header file
//

#if !defined(AFX_SADLG_H__33D93B0B_D0B8_11D2_96EE_006097CDB9E2__INCLUDED_)
#define AFX_SADLG_H__33D93B0B_D0B8_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000

/////////////////////////////////////////////////////////////////////////////
// CSaDlg dialog

class CSaDlg : public CDialog
{
// Construction
public:
  CSaDlg(CWnd* pParent = NULL); // standard constructor

// Dialog Data
  //{{AFX_DATA(CSaDlg)
  enum { IDD = IDD_SA_DIALOG };
    // NOTE: the ClassWizard will add data members here
  //}}AFX_DATA

  // ClassWizard generated virtual function overrides
  //{{AFX_VIRTUAL(CSaDlg)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);  // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:
  HICON m_hIcon;

  // Generated message map functions
  //{{AFX_MSG(CSaDlg)
  virtual BOOL OnInitDialog();
  afx_msg void OnSysCommand(UINT nID, LPARAM lParam);
  afx_msg void OnPaint();
  afx_msg HCURSOR OnQueryDragIcon();
  afx_msg void OnButton1();
  afx_msg void OnButton2();
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()
};

//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_SADLG_H__33D93B0B_D0B8_11D2_96EE_006097CDB9E2__INCLUDED_)
```

0085

```
// saDlg.cpp : implementation file
//

#include "stdafx.h"
#include "sa.h"
#include "saDlg.h"

#include "unit_ppi.h"
#include "functs.h"
#include "TabDialog.h"

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif


static    int cmd_delay = 1000;
static    int io_delay = 50;


/////////////////////////////////////////////////////////////////////////////
// CAboutDlg dialog used for App About

class CAboutDlg : public CDialog
{
public:
  CAboutDlg();

// Dialog Data
  //{{AFX_DATA(CAboutDlg)
  enum { IDD = IDD_ABOUTBOX };
  //}}AFX_DATA

  // ClassWizard generated virtual function overrides
  //{{AFX_VIRTUAL(CAboutDlg)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:
  //{{AFX_MSG(CAboutDlg)
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()
};

CAboutDlg::CAboutDlg() : CDialog(CAboutDlg::IDD)
{
  //{{AFX_DATA_INIT(CAboutDlg)
  //}}AFX_DATA_INIT
}

void CAboutDlg::DoDataExchange(CDataExchange* pDX)
{
  CDialog::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CAboutDlg)
  //}}AFX_DATA_MAP
}

BEGIN_MESSAGE_MAP(CAboutDlg, CDialog)
  //{{AFX_MSG_MAP(CAboutDlg)
    // No message handlers
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CSaDlg dialog

CSaDlg::CSaDlg(CWnd* pParent /*=NULL*/)
  : CDialog(CSaDlg::IDD, pParent)
```

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```
{
  //{{AFX_DATA_INIT(CSaDlg)
    // NOTE: the ClassWizard will add member initialization here
  //}}AFX_DATA_INIT
  // Note that LoadIcon does not require a subsequent DestroyIcon in Win32
  m_hIcon = AfxGetApp()->LoadIcon(IDR_MAINFRAME);
}

void CSaDlg::DoDataExchange(CDataExchange* pDX)
{
  CDialog::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CSaDlg)
    // NOTE: the ClassWizard will add DDX and DDV calls here
  //}}AFX_DATA_MAP
}

BEGIN_MESSAGE_MAP(CSaDlg, CDialog)
  //{{AFX_MSG_MAP(CSaDlg)
  ON_WM_SYSCOMMAND()
  ON_WM_PAINT()
  ON_WM_QUERYDRAGICON()
  ON_BN_CLICKED(IDC_BUTTON1, OnButton1)
  ON_BN_CLICKED(IDC_BUTTON2, OnButton2)
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CSaDlg message handlers

BOOL CSaDlg::OnInitDialog()
{
  CDialog::OnInitDialog();

  // Add "About..." menu item to system menu.

  // IDM_ABOUTBOX must be in the system command range.
  ASSERT((IDM_ABOUTBOX & 0xFFF0) == IDM_ABOUTBOX);
  ASSERT(IDM_ABOUTBOX < 0xF000);

  CMenu* pSysMenu = GetSystemMenu(FALSE);
  if (pSysMenu != NULL)
  {
    CString strAboutMenu;
    strAboutMenu.LoadString(IDS_ABOUTBOX);
    if (!strAboutMenu.IsEmpty())
    {
      pSysMenu->AppendMenu(MF_SEPARATOR);
      pSysMenu->AppendMenu(MF_STRING, IDM_ABOUTBOX, strAboutMenu);
    }
  }

  // Set the icon for this dialog.  The framework does this automatically
  //  when the application's main window is not a dialog
  SetIcon(m_hIcon, TRUE);     // Set big icon
  SetIcon(m_hIcon, FALSE);    // Set small icon

  // TODO: Add extra initialization here
  if( load_dll()==false )
  {
    MessageBox("UNIT_PPI not found in the system directory. Fix this and restart application.");
    return false;
  }
  init_port_spi(1);
  set_cmd_delay_cnt_value(cmd_delay);
  set_io_delay_cnt_value(io_delay);

  return TRUE;  // return TRUE  unless you set the focus to a control
}

void CSaDlg::OnSysCommand(UINT nID, LPARAM lParam)
{
  if ((nID & 0xFFF0) == IDM_ABOUTBOX)
```

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```
    {
      CAboutDlg dlgAbout;
      dlgAbout.DoModal();
    }
    else
    {
      CDialog::OnSysCommand(nID, lParam);
    }
}

// If you add a minimize button to your dialog, you will need the code below
//  to draw the icon.  For MFC applications using the document/view model,
//  this is automatically done for you by the framework.

void CSaDlg::OnPaint()
{
  if (IsIconic())
  {
    CPaintDC dc(this); // device context for painting

    SendMessage(WM_ICONERASEBKGND, (WPARAM) dc.GetSafeHdc(), 0);

    // Center icon in client rectangle
    int cxIcon = GetSystemMetrics(SM_CXICON);
    int cyIcon = GetSystemMetrics(SM_CYICON);
    CRect rect;
    GetClientRect(&rect);
    int x = (rect.Width() - cxIcon + 1) / 2;
    int y = (rect.Height() - cyIcon + 1) / 2;

    // Draw the icon
    dc.DrawIcon(x, y, m_hIcon);
  }
  else
  {
    CDialog::OnPaint();
  }
}

// The system calls this to obtain the cursor to display while the user drags
//  the minimized window.
HCURSOR CSaDlg::OnQueryDragIcon()
{
  return (HCURSOR) m_hIcon;
}

void CSaDlg::OnButton1()
{

  long tlong;

  tlong=spi_xchng24(0xAA55AA);
  tlong=spi_xchng24(0x0);

}

void CSaDlg::OnButton2()
{
//  long tlong;
//
//  tlong=spi_xchng24(0x654321);
//  tlong=spi_xchng24(0x0);

    CTabDialog dlg;

    dlg.DoModal();

}
```

0088

```
// sa.h : main header file for the SA application
//

#if !defined(AFX_SA_H__33D93B09_D0B8_11D2_96EE_006097CDB9E2__INCLUDED_)
#define AFX_SA_H__33D93B09_D0B8_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000

#ifndef __AFXWIN_H__
  #error include 'stdafx.h' before including this file for PCH
#endif

#include "resource.h"   // main symbols

/////////////////////////////////////////////////////////////////////////////
// CSaApp:
// See sa.cpp for the implementation of this class
//

class CSaApp : public CWinApp
{
public:
  CSaApp();

// Overrides
  // ClassWizard generated virtual function overrides
  //{{AFX_VIRTUAL(CSaApp)
  public:
  virtual BOOL InitInstance();
  //}}AFX_VIRTUAL

// Implementation

  //{{AFX_MSG(CSaApp)
    // NOTE - the ClassWizard will add and remove member functions here.
    //    DO NOT EDIT what you see in these blocks of generated code !
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()
};


/////////////////////////////////////////////////////////////////////////////

//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_SA_H__33D93B09_D0B8_11D2_96EE_006097CDB9E2__INCLUDED_)
```

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```
// sa.cpp : Defines the class behaviors for the application.
//

#include "stdafx.h"
#include "sa.h"
#include "saDlg.h"
#include "TabDialog.h"
#include "I2CDialog.h"
#include "DSP56kManager.h"

CDSP56kManager *g_DSPManager;

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CSaApp

BEGIN_MESSAGE_MAP(CSaApp, CWinApp)
  //{{AFX_MSG_MAP(CSaApp)
    // NOTE - the ClassWizard will add and remove mapping macros here.
    //    DO NOT EDIT what you see in these blocks of generated code!
  //}}AFX_MSG
  ON_COMMAND(ID_HELP, CWinApp::OnHelp)
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CSaApp construction

CSaApp::CSaApp()
{
  // TODO: add construction code here,
  // Place all significant initialization in InitInstance
}

/////////////////////////////////////////////////////////////////////////////
// The one and only CSaApp object

CSaApp theApp;

/////////////////////////////////////////////////////////////////////////////
// CSaApp initialization

BOOL CSaApp::InitInstance()
{

  AfxEnableControlContainer();

  // Standard initialization
  // If you are not using these features and wish to reduce the size
  //  of your final executable, you should remove from the following
  //  the specific initialization routines you do not need.

#ifdef _AFXDLL
  Enable3dControls();     // Call this when using MFC in a shared DLL
#else
  Enable3dControlsStatic(); // Call this when linking to MFC statically
#endif

  // Set dialog background color to black
//  SetDialogBkColor(RGB(0,0,0),RGB(255,255,255));

  int response;
  CI2CDialog  idlg;
  try
  {

    if( (response = idlg.DoModal()) != IDOK )
    {
```

0090

```
        if( response == IDABORT )
        {
          AfxMessageBox("Trouble initializing");
          Sleep(1000);
        }
//        return FALSE;
      }

  }
  catch(CException* e )
  {
//        printf("Trouble initializing\n");
//        Sleep(1000);
       return FALSE;
  }.


  //  CSaDlg dlg;
  CTabDialog  dlg;

  m_pMainWnd = &dlg;
  int nResponse = dlg.DoModal();
  if (nResponse == IDOK)
  {
    // TODO: Place code here to handle when the dialog is
    //  dismissed with OK
  }
  else if (nResponse == IDCANCEL)
  {
    // TODO: Place code here to handle when the dialog is
    //  dismissed with Cancel
  }

  // Since the dialog has been closed, return FALSE so that we exit the
  //  application, rather than start the application's message pump.
  return FALSE;
}
```

```
//{{NO_DEPENDENCIES}}
// Microsoft Developer Studio generated include file.
// Used by sa.rc
//
#define IDM_ABOUTBOX                    0x0010
#define IDD_ABOUTBOX                    100
#define IDS_ABOUTBOX                    101
#define IDD_SA_DIALOG                   102
#define IDR_MAINFRAME                   128
#define IDD_DIALOG1                     129
#define IDD_PP1                         130
#define IDR_MENU1                       130
#define IDD_PP2                         131
#define IDD_PP3                         132
#define IDD_PP4                         133
#define IDD_PP5                         134
#define IDD_PP6                         135
#define IDD_PP7                         136
#define IDD_PP8                         137
#define IDD_PP9                         138
#define IDD_DIALOG2                     139
#define IDD_DIALOG3                     140
#define IDD_DIALOG4                     141
#define IDD_PP10                        142
#define IDD_PP11                        143
#define IDC_BUTTON1                     1001
#define IDC_BUTTON2                     1002
#define IDC_SLIDER1                     1004
#define IDC_CHECK1                      1005
#define IDC_SLIDER2                     1005
#define IDC_SLIDER3                     1006
#define IDC_RADIO1                      1006
#define IDC_SLIDER4                     1007
#define IDC_CHECK2                      1007
#define IDC_RADIO2                      1007
#define IDC_EDIT1                       1007
#define IDC_SLIDER5                     1008
#define IDC_CHECK3                      1008
#define IDC_RADIO3                      1008
#define IDC_SLIDER6                     1009
#define IDC_CHECK4                      1009
#define IDC_RADIO4                      1009
#define IDC_SLIDER7                     1010
#define IDC_CHECK5                      1010
#define IDC_SLIDER8                     1011
#define IDC_CHECK6                      1011
#define IDC_SLIDER9                     1012
#define IDC_CHECK7                      1013
#define ID_MENUITEM32771                32771
#define ID_MENUITEM32772                32772
#define ID_FILE_EXPORTPARAMFILE         32773

// Next default values for new objects
//
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE        142
#define _APS_NEXT_COMMAND_VALUE         32774
#define _APS_NEXT_CONTROL_VALUE         1011
#define _APS_NEXT_SYMED_VALUE           103
#endif
#endif
```

```
#if !defined(AFX_TABDIALOG_H__5CB3DF04_D20F_11D2_96EE_006097CDB9E2__INCLUDED_)
#define AFX_TABDIALOG_H__5CB3DF04_D20F_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000
// TabDialog.h : header file
//

#include "Page1.h"
#include "MainPage.h"
#include "DDX.h"
#include "NotchPage1.h"
#include "NotchPage2.h"
#include "StWaveRejPage.h"
#include "ShelvPage.h"
#include "NewCutoffPage.h"
#include "AllpassPage.h"
#include "DBNotch.h"

/////////////////////////////////////////////////////////////////////////////
// CTabDialog dialog


class CTabDialog : public CDialog
{
// Construction
public:
  void DisplayI2CState(long error);
  virtual void SetStatusString(int which,CString &s);
  CTabDialog(CWnd* pParent = NULL);   // standard constructor

// Dialog Data
  //{{AFX_DATA(CTabDialog)
  enum { IDD = IDD_DIALOG1 };
    // NOTE: the ClassWizard will add data members here
  //}}AFX_DATA


// Overrides
  // ClassWizard generated virtual function overrides
  //{{AFX_VIRTUAL(CTabDialog)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:
  virtual void DisplayMode(int);

  CStatusBar      m_StatusBar;
  CPropertySheet  m_dlgPropSheet;
  HICON           m_hIcon;
//  CPage1          m_Page1;
  CMainPage       m_MainPage;
  CDDX            m_DDXPage;
  CNotchPage1     m_Notch1Page;
  CNotchPage2     m_Notch2Page;
  CStWaveRejPage  m_StWaveRejPage;
  CShelvPage      m_ShelvPage;
//  CCutoffPage     m_CutoffPage;
  CNewCutoffPage  m_CutoffPage;
  CAllpassPage    m_AllpassPage;
  CDBNotch        m_DBNotch;
  CBrush          m_brush;
  UINT            m_timerID;
  BOOL            m_HDCDDisplay;
  int             m_AIdx,m_ICnt;
  int             m_ErrorCounter;

  // Generated message map functions
  //{{AFX_MSG(CTabDialog)
```

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```
    virtual BOOL OnInitDialog();
    afx_msg void OnSysCommand(UINT nID, LPARAM lParam);
    afx_msg void OnPaint();
    afx_msg HCURSOR OnQueryDragIcon();
    afx_msg void OnClose();
    afx_msg void OnMove(int x, int y);
    afx_msg HBRUSH OnCtlColor(CDC* pDC, CWnd* pWnd, UINT nCtlColor);
    afx_msg void OnOpenMenu();
    afx_msg void OnSaveMenu();
    afx_msg void OnTimer(UINT nIDEvent);
    afx_msg void OnFileExportparamfile();
    //}}AFX_MSG
    DECLARE_MESSAGE_MAP()
};


//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_TABDIALOG_H__5CB3DF04_D20F_11D2_96EE_006097CDB9E2__INCLUDED_)
```

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```
// TabDialog.cpp : implementation file
//

#include "stdafx.h"
#include "sa.h"
#include "TabDialog.h"
#include "DSP56kManager.h"
#include "I2CCommErrorDialog.h"
#include <afxdlgs.h>

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif


#define TIMERID 1
#define ID_HDCD_DETECT    56000
#define ID_ERROR_DISPLAY  (ID_HDCD_DETECT+1)

static UINT auIDStatusBar[] = {
   ID_SEPARATOR,
   ID_HDCD_DETECT,
   ID_SEPARATOR,
   ID_ERROR_DISPLAY
};


#define AARRAYSIZE  16
static  char  *Detect_Array[AARRAYSIZE] = {
"            HDCD",
"           HDCD ",
"          HDCD  ",
"         HDCD   ",
"        HDCD    ",
"       HDCD     ",
"      HDCD      ",
"     HDCD       ",
"    HDCD        ",
"   HDCD         ",
"  HDCD          ",
" HDCD           ",
"HDCD            ",
"DCD            H",
"CD            HD",
"D            HDC"
};


/////////////////////////////////////////////////////////////////////////////
// CTabAboutDlg dialog used for App About

class CTabAboutDlg : public CDialog
{
public:
  CTabAboutDlg();

// Dialog Data
  //{{AFX_DATA(CTabAboutDlg)
  enum { IDD = IDD_ABOUTBOX };
  //}}AFX_DATA

  // ClassWizard generated virtual function overrides
  //{{AFX_VIRTUAL(CTabAboutDlg)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:
  //{{AFX_MSG(CTabAboutDlg)
```

0095

```
    //}}AFX_MSG
    DECLARE_MESSAGE_MAP()
};

CTabAboutDlg::CTabAboutDlg() : CDialog(CTabAboutDlg::IDD)
{
    //{{AFX_DATA_INIT(CTabAboutDlg)
    //}}AFX_DATA_INIT
}

void CTabAboutDlg::DoDataExchange(CDataExchange* pDX)
{
    CDialog::DoDataExchange(pDX);
    //{{AFX_DATA_MAP(CTabAboutDlg)
    //}}AFX_DATA_MAP
}

BEGIN_MESSAGE_MAP(CTabAboutDlg, CDialog)
    //{{AFX_MSG_MAP(CTabAboutDlg)
      // No message handlers
    //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CTabDialog dialog


CTabDialog::CTabDialog(CWnd* pParent /*=NULL*/)
    : CDialog(CTabDialog::IDD, pParent)
{
    //{{AFX_DATA_INIT(CTabDialog)
      // NOTE: the ClassWizard will add member initialization here
    //}}AFX_DATA_INIT
    m_hIcon = AfxGetApp()->LoadIcon(IDR_MAINFRAME);
}


void CTabDialog::DoDataExchange(CDataExchange* pDX)
{
    CDialog::DoDataExchange(pDX);
    //{{AFX_DATA_MAP(CTabDialog)
      // NOTE: the ClassWizard will add DDX and DDV calls here
    //}}AFX_DATA_MAP
}


BEGIN_MESSAGE_MAP(CTabDialog, CDialog)
    //{{AFX_MSG_MAP(CTabDialog)
    ON_WM_SYSCOMMAND()
    ON_WM_PAINT()
    ON_WM_QUERYDRAGICON()
    ON_WM_CLOSE()
    ON_WM_MOVE()
    ON_WM_CTLCOLOR()
    ON_COMMAND(ID_MENUITEM32771, OnOpenMenu)
    ON_COMMAND(ID_MENUITEM32772, OnSaveMenu)
    ON_WM_TIMER()
    ON_COMMAND(ID_FILE_EXPORTPARAMFILE, OnFileExportparamfile)
    //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CTabDialog message handlers

#define PS_WIDTH  222
#define PS_HEIGHT 215

BOOL CTabDialog::OnInitDialog()
{

    int partsList[] = { 50, 100,  150,  -1};
```

0096

```
CDialog::OnInitDialog();


// Add "About..." menu item to system menu.

// IDM_ABOUTBOX must be in the system command range.
ASSERT((IDM_ABOUTBOX & 0xFFF0) == IDM_ABOUTBOX);
ASSERT(IDM_ABOUTBOX < 0xF000);

CMenu* pSysMenu = GetSystemMenu(FALSE);
if (pSysMenu != NULL)
{
  CString strAboutMenu;
  strAboutMenu.LoadString(IDS_ABOUTBOX);
  if (!strAboutMenu.IsEmpty())
  {
    pSysMenu->AppendMenu(MF_SEPARATOR);
    pSysMenu->AppendMenu(MF_STRING, IDM_ABOUTBOX, strAboutMenu);
  }
}

// Set the icon for this dialog.  The framework does this automatically
//  when the application's main window is not a dialog
SetIcon(m_hIcon, TRUE);     // Set big icon
SetIcon(m_hIcon, FALSE);    // Set small icon

// build brush
m_brush.CreateSolidBrush(RGB(0,0,0));

// build prop sheet
m_dlgPropSheet.AddPage(&m_MainPage);
m_dlgPropSheet.AddPage(&m_DDXPage);
m_dlgPropSheet.AddPage(&m_ShelvPage);
m_dlgPropSheet.AddPage(&m_CutoffPage);
m_dlgPropSheet.AddPage(&m_Notch1Page);
m_dlgPropSheet.AddPage(&m_Notch2Page);
m_dlgPropSheet.AddPage(&m_StWaveRejPage);
m_dlgPropSheet.AddPage(&m_AllpassPage);
m_dlgPropSheet.AddPage(&m_DBNotch);

m_dlgPropSheet.Create(this, WS_CHILD | WS_VISIBLE, 0);
m_dlgPropSheet.ModifyStyleEx(0, WS_EX_CONTROLPARENT);
m_dlgPropSheet.ModifyStyle(0, WS_TABSTOP);

m_dlgPropSheet.SetWindowPos(NULL, 0, 0, PS_WIDTH, PS_HEIGHT, SWP_NOZORDER | SWP_NOSIZE | SWP_NOACTIVATE );

  // resize dialog to fit propsheet exactly
RECT rect;
m_dlgPropSheet.GetWindowRect(&rect);
//rect.bottom += 14;
//rect.right += 14;
SetWindowPos(&wndBottom,rect.left,rect.top,rect.right,rect.bottom, SWP_NOZORDER | SWP_NOMOVE );

// Add status bar
RECT sizerect;
sizerect.top = PS_HEIGHT;
sizerect.bottom = sizerect.top + 20;
sizerect.left = 0;
sizerect.right = PS_WIDTH;
//m_StatusBar.Create(WS_CHILD | WS_VISIBLE | CCS_BOTTOM, sizerect , this, AFX_IDW_STATUS_BAR );
//m_StatusBar.ShowWindow(SW_SHOWNA);
//m_StatusBar.SetSimple();
//m_StatusBar.SetText("Hello world!",255,0);
m_StatusBar.Create(this);
//m_StatusBar.SetIndicators(auIDStatusBar, sizeof(auIDStatusBar)/sizeof(UINT));
//m_StatusBar.SetPaneInfo(0, m_StatusBar.GetItemID(0), SBPS_STRETCH, NULL );
//m_StatusBar.GetStatusBarCtrl().SetText("Hello world!",0,0);

CRect rcClientStart;
CRect rcClientNow;
GetClientRect(rcClientStart);
```

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```
    RepositionBars(AFX_IDW_CONTROLBAR_FIRST, AFX_IDW_CONTROLBAR_LAST,
            0, reposQuery, rcClientNow);

    // Now move all the controls so they are in the same relative
    // position within the remaining client area as they would be
    // with no control bars.
  /*  CPoint ptOffset(rcClientNow.left - rcClientStart.left,
            rcClientNow.top - rcClientStart.top);

    CRect  rcChild;
    CWnd* pwndChild = GetWindow(GW_CHILD);
    while (pwndChild)
    {
      pwndChild->GetWindowRect(rcChild);
      ScreenToClient(rcChild);
      rcChild.OffsetRect(ptOffset);
      pwndChild->MoveWindow(rcChild, FALSE);
      pwndChild = pwndChild->GetNextWindow();
    } */

    // Adjust the dialog window dimensions
    CRect rcWindow;
    GetWindowRect(rcWindow);
    rcWindow.right += rcClientStart.Width() - rcClientNow.Width();
    rcWindow.bottom += rcClientStart.Height() - rcClientNow.Height();
    rcWindow.bottom += 5;
    MoveWindow(rcWindow, FALSE);

    // And position the control bars
    RepositionBars(AFX_IDW_CONTROLBAR_FIRST, AFX_IDW_CONTROLBAR_LAST, 0);

    m_timerID = 0;
    m_timerID = SetTimer(TIMERID,50,NULL);
    m_ErrorCounter = 0;

    m_HDCDDisplay = false;
    DisplayMode(1);
    SetWindowText("Untitled");
    partsList[0] = rcClientNow.Width()/4;
    partsList[1] = partsList[0] + (rcClientNow.Width()/4);
    partsList[2] = partsList[1] + (rcClientNow.Width()/4);
    partsList[3] = -1;
    m_StatusBar.GetStatusBarCtrl().SetParts(sizeof(partsList)/sizeof(int),partsList);


    return TRUE;  // return TRUE unless you set the focus to a control
                  // EXCEPTION: OCX Property Pages should return FALSE
  }

  void CTabDialog::OnClose()
  {

  //  if( m_Page1 )
  //    delete  m_Page1;
  //  if( m_Page2 )
  //    delete  m_Page2;
  //  if( m_Page3 )
  //    delete  m_Page3;

    if( m_timerID )
      KillTimer( m_timerID );

    delete g_DSPManager;

    CDialog::OnClose();
  }

  void CTabDialog::OnSysCommand(UINT nID, LPARAM lParam)
  {
    if ((nID & 0xFFF0) == IDM_ABOUTBOX)
    {
      CTabAboutDlg dlgAbout;
```

```
      dlgAbout.DoModal();
    }
    else
    {
      CDialog::OnSysCommand(nID, lParam);
    }
  }

  void CTabDialog::OnPaint()
  {
  //  CPaintDC dc(this); // device context for painting

    // TODO: Add your message handler code here

    // Do not call CDialog::OnPaint() for painting messages

    if (IsIconic())
    {
      CPaintDC dc(this); // device context for painting

      SendMessage(WM_ICONERASEBKGND, (WPARAM) dc.GetSafeHdc(), 0);

      // Center icon in client rectangle
      int cxIcon = GetSystemMetrics(SM_CXICON);
      int cyIcon = GetSystemMetrics(SM_CYICON);
      CRect rect;
      GetClientRect(&rect);
      int x = (rect.Width() - cxIcon + 1) / 2;
      int y = (rect.Height() - cyIcon + 1) / 2;

      // Draw the icon
      dc.DrawIcon(x, y, m_hIcon);
    }
    else
    {
      //m_StatusBar.RedrawWindow();
      CDialog::OnPaint();
    }

  }

  void CTabDialog::OnMove(int x, int y)
  {
    CDialog::OnMove(x, y);

    // TODO: Add your message handler code here

  }

  // The system calls this to obtain the cursor to display while the user drags
  //  the minimized window.
  HCURSOR CTabDialog::OnQueryDragIcon()
  {
    return (HCURSOR) m_hIcon;
  }

  HBRUSH CTabDialog::OnCtlColor(CDC* pDC, CWnd* pWnd, UINT nCtlColor)
  {

    HBRUSH hbr = CDialog::OnCtlColor(pDC, pWnd, nCtlColor);

    // TODO: Change any attributes of the DC here

    // TODO: Return a different brush if the default is not desired
    return hbr;
  #if 0
    return m_brush;
  #endif
  }

  void CTabDialog::OnOpenMenu()
  {
```

```
  // TODO: Add your command handler code here
//  char BASED_CODE szFilter[] = "Text Files (*.txt)|*.txt||";
//  CFileDialog fileDlg(TRUE,NULL,NULL,0L,szFilter,NULL);


//  CFileDialog fileDlg(TRUE);
  CFileDialog fileDlg(TRUE,"txt",NULL,OFN_HIDEREADONLY,"Text Files (*.txt)|*.txt|All Files (*.*)|*.*||",this)

  if( fileDlg.DoModal() == IDOK )
    {
      int array_size = 0;
      CString string;
      CStringArray array;
      CStdioFile file(fileDlg.GetPathName(),CFile::modeRead | CFile::typeText);
      while( file.ReadString(string) )
      {
        array.SetAtGrow(array_size, string );
        array_size++;
      }
      g_DSPManager->SetDSPSettings(array);
      SetWindowText(fileDlg.GetFileName());
      // MM 5/13/99 Invalidate the window so that window is redrawn
      Invalidate(false);
    }

}

void CTabDialog::OnSaveMenu()
{

  // TODO: Add your command handler code here

  CFileDialog fileDlg(FALSE,"txt",NULL,OFN_OVERWRITEPROMPT|OFN_HIDEREADONLY,"Text Files (*.txt)|*.txt||",this
;

  if( fileDlg.DoModal() == IDOK )
    {
      int array_index = 0;
      CString string;
      CStringArray array;
      g_DSPManager->GetDSPSettings(array);
      CStdioFile file(fileDlg.GetPathName(),CFile::modeCreate | CFile::modeWrite | CFile::typeText);
      while( array_index < array.GetSize() )
      {
        string = array.GetAt(array_index);
        file.WriteString(string);
        file.WriteString("\n");
        array_index++;
      }
    }

}

void CTabDialog::OnFileExportparamfile()
{

  CFileDialog fileDlg(FALSE,"prm",NULL,OFN_OVERWRITEPROMPT|OFN_HIDEREADONLY,"Parameter Files (*.prm)|*.prm||",
this);

  if( fileDlg.DoModal() == IDOK )
    {
      int array_index = 0;
      CString string;
      CStringArray array;
      g_DSPManager->GetFilterBlob(array);
      CStdioFile file(fileDlg.GetPathName(),CFile::modeCreate | CFile::modeWrite | CFile::typeBinary);
      while( array_index < array.GetSize() )
      {
        string = array.GetAt(array_index);
        file.WriteString(string);
        file.WriteString("\n");
        array_index++;
```

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```
    }
  }
}

void CTabDialog::OnTimer(UINT nIDEvent)
{
  // TODO: Add your message handler code here and/or call default
  if( nIDEvent == TIMERID )
    {
      DisplayMode(g_DSPManager->GetHDCDMode());
      DisplayI2CState(0L);
    }
  else
    {
      CDialog::OnTimer(nIDEvent);
    }

}

void CTabDialog::DisplayMode(int value)
{

  if( value < 0 )
    {
      DisplayI2CState(-value);
      /* char s[100];
      sprintf(s,"0x%x",-value);
      m_StatusBar.GetStatusBarCtrl().SetText(s,3,0); */
      /* if( m_timerID )
        KillTimer( m_timerID );
      CI2CCommErrorDialog dlg;
      char s[100];
      sprintf(s,"0x%x",-value);
      dlg.m_ErrorCode = s;
      if( dlg.DoModal() == IDCANCEL )
        EndDialog(IDCANCEL);
      else
        m_timerID = SetTimer(TIMERID,50,NULL);  */
    }
  else if( value )
    {
      if( !m_HDCDDisplay )
      {
        m_ICnt = 0;
        m_AIdx = 0;
        m_StatusBar.GetStatusBarCtrl().SetText(Detect_Array[m_AIdx++],1,0);
        //SetWindowText(Detect_Array[m_AIdx++]);
      }
      else
      {
        m_ICnt++;
        if( m_ICnt > 5 )
        {
          m_ICnt = 0;
          m_StatusBar.GetStatusBarCtrl().SetText(Detect_Array[m_AIdx++],1,0);
          //SetWindowText(Detect_Array[m_AIdx++]);
          if( m_AIdx >= AARRAYSIZE )
            m_AIdx = 0;
        }
      }
      m_HDCDDisplay = true;
    }
  else
    {
      if( m_HDCDDisplay )
        m_StatusBar.GetStatusBarCtrl().SetText("BAD CD..NO DONUT",1,0);
        //SetWindowText("BAD CD .. NO DONUT");
      m_HDCDDisplay = false;
    }
```

0101

```
}

void CTabDialog::SetStatusString(int which, CString & s)
{

  m_StatusBar.GetStatusBarCtrl().SetText(s,0,0);

}

void CTabDialog::DisplayI2CState(long error)
{

  if( error )
  {
    char s[100];
    sprintf(s,"0x%x",error);
    m_StatusBar.GetStatusBarCtrl().SetText(s,3,0);
    m_ErrorCounter = 100;    // 5 seconds
  }
  else
  {
    if( m_ErrorCounter )
    {
      m_ErrorCounter--;
      if( m_ErrorCounter > 0 )
        return;
    }   if( g_DSPManager->IsBusy() )
      {
        m_StatusBar.GetStatusBarCtrl().SetText("Transmitting..",3,0);
      }
    else
      {
        m_StatusBar.GetStatusBarCtrl().SetText("",3,0);
      }
  }

}
```

```
#if !defined(AFX_STWAVER[redacted]GE_H__0CF7E209_D790_11D2_96EE_006097CD[redacted]__INCLUDED_)
#define AFX_STWAVEREJPAGE_H__0CF7E209_D790_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000
// StWaveRejPage.h : header file
//

/////////////////////////////////////////////////////////////////////////////
// CStWaveRejPage dialog

class CTabDialog;

class CStWaveRejPage : public CPropertyPage
{
  DECLARE_DYNCREATE(CStWaveRejPage)

// Construction
public:
  CStWaveRejPage();
  -CStWaveRejPage();

// Dialog Data
  //{{AFX_DATA(CStWaveRejPage)
  enum { IDD = IDD_PP5 };
  CButton m_BypassButton;
  CSliderCtrl m_Notch3BoostSlider;
  CSliderCtrl m_Notch3QSlider;
  CSliderCtrl m_Notch2CutSlider;
  CSliderCtrl m_Notch2QSlider;
  CSliderCtrl m_Notch2FreqSlider;
  CSliderCtrl m_Notch1CutSlider;
  CSliderCtrl m_Notch1QSlider;
  CSliderCtrl m_Notch1FreqSlider;
  //}}AFX_DATA


// Overrides
  // ClassWizard generate virtual function overrides
  //{{AFX_VIRTUAL(CStWaveRejPage)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:
  // Generated message map functions
  //{{AFX_MSG(CStWaveRejPage)
  virtual BOOL OnInitDialog();
  afx_msg void OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar);
  afx_msg void OnShowWindow(BOOL bShow, UINT nStatus);
  afx_msg void OnPaint();
  afx_msg void OnBypass();
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()

  CTabDialog *m_ParentWindow;
  void SendStringToUI(int which);

};

//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_STWAVEREJPAGE_H__0CF7E209_D790_11D2_96EE_006097CDB9E2__INCLUDED_)
```

0103

```
// StWaveRejPage.cpp : implementation file
//

#include "stdafx.h"
#include "sa.h"
#include "StWaveRejPage.h"
#include "TabDialog.h"
#include "DSP56kManager.h"

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CStWaveRejPage property page

IMPLEMENT_DYNCREATE(CStWaveRejPage, CPropertyPage)

CStWaveRejPage::CStWaveRejPage() : CPropertyPage(CStWaveRejPage::IDD)
{
  //{{AFX_DATA_INIT(CStWaveRejPage)
  //}}AFX_DATA_INIT
}

CStWaveRejPage::~CStWaveRejPage()
{
}

void CStWaveRejPage::DoDataExchange(CDataExchange* pDX)
{
  CPropertyPage::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CStWaveRejPage)
  DDX_Control(pDX, IDC_CHECK5, m_BypassButton);
  DDX_Control(pDX, IDC_SLIDER9, m_Notch3BoostSlider);
  DDX_Control(pDX, IDC_SLIDER8, m_Notch3QSlider);
  DDX_Control(pDX, IDC_SLIDER6, m_Notch2CutSlider);
  DDX_Control(pDX, IDC_SLIDER5, m_Notch2QSlider);
  DDX_Control(pDX, IDC_SLIDER4, m_Notch2FreqSlider);
  DDX_Control(pDX, IDC_SLIDER3, m_Notch1CutSlider);
  DDX_Control(pDX, IDC_SLIDER2, m_Notch1QSlider);
  DDX_Control(pDX, IDC_SLIDER1, m_Notch1FreqSlider);
  //}}AFX_DATA_MAP
}


BEGIN_MESSAGE_MAP(CStWaveRejPage, CPropertyPage)
  //{{AFX_MSG_MAP(CStWaveRejPage)
  ON_WM_VSCROLL()
  ON_WM_SHOWWINDOW()
  ON_WM_PAINT()
  ON_BN_CLICKED(IDC_CHECK5, OnBypass)
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CStWaveRejPage message handlers

BOOL CStWaveRejPage::OnInitDialog()
{
  CPropertyPage::OnInitDialog();

  // TODO: Add extra initialization here
  m_Notch1FreqSlider.SetRange(0,CONTROL_RANGE);
  m_Notch1FreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch3Freq));
  m_Notch1FreqSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_Notch1FreqSlider.SetPageSize(PG_CONTROL_AMT);

  m_Notch1QSlider.SetRange(0,CONTROL_RANGE);
  m_Notch1QSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch3Q));
  m_Notch1QSlider.SetTicFreq((CONTROL_RANGE+1)/16);
```

0104

```
    m_Notch1QSlider.SetPage[redacted](PG_CONTROL_AMT);

    m_Notch1CutSlider.SetRange(0,CONTROL_RANGE);
    m_Notch1CutSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch3Cut));
    m_Notch1CutSlider.SetTicFreq((CONTROL_RANGE+1)/16);
    m_Notch1CutSlider.SetPageSize(PG_CONTROL_AMT);

    m_Notch2FreqSlider.SetRange(0,CONTROL_RANGE);
    m_Notch2FreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch4Freq));
    m_Notch2FreqSlider.SetTicFreq((CONTROL_RANGE+1)/16);
    m_Notch2FreqSlider.SetPageSize(PG_CONTROL_AMT);

    m_Notch2QSlider.SetRange(0,CONTROL_RANGE);
    m_Notch2QSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch4Q));
    m_Notch2QSlider.SetTicFreq((CONTROL_RANGE+1)/16);
    m_Notch2QSlider.SetPageSize(PG_CONTROL_AMT);

    m_Notch2CutSlider.SetRange(0,CONTROL_RANGE);
    m_Notch2CutSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch4Cut));
    m_Notch2CutSlider.SetTicFreq((CONTROL_RANGE+1)/16);
    m_Notch2CutSlider.SetPageSize(PG_CONTROL_AMT);

    m_Notch3QSlider.SetRange(0,CONTROL_RANGE);
    m_Notch3QSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch5Q));
    m_Notch3QSlider.SetTicFreq((CONTROL_RANGE+1)/16);
    m_Notch3QSlider.SetPageSize(PG_CONTROL_AMT);

    m_Notch3BoostSlider.SetRange(0,CONTROL_RANGE);
    m_Notch3BoostSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch5Cut));
    m_Notch3BoostSlider.SetTicFreq((CONTROL_RANGE+1)/16);
    m_Notch3BoostSlider.SetPageSize(PG_CONTROL_AMT);


    m_ParentWindow = (CTabDialog *) GetParent()->GetParent();

    return TRUE;  // return TRUE unless you set the focus to a control
                  // EXCEPTION: OCX Property Pages should return FALSE
}

void CStWaveRejPage::SendStringToUI(int which)
{

    CString str;

    g_DSPManager->GetStringValue(which,str);
    m_ParentWindow->SetStatusString(0,str);

}

void CStWaveRejPage::OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar)
{
  // TODO: Add your message handler code here and/or call default
  CSliderCtrl *slider = (CSliderCtrl *)pScrollBar;
  int which;

  CPropertyPage::OnVScroll(nSBCode, nPos, pScrollBar);

  Sleep(50);
  if( slider == &m_Notch1FreqSlider )
    which = kNotch3Freq;
  else if( slider == &m_Notch1QSlider )
    which = kNotch3Q;
  else if( slider == &m_Notch1CutSlider )
    which = kNotch3Cut;
  else if( slider == &m_Notch2FreqSlider )
    which = kNotch4Freq;
  else if( slider == &m_Notch2QSlider )
    which = kNotch4Q;
  else if( slider == &m_Notch2CutSlider )
    which = kNotch4Cut;
  else if( slider == &m_Notch3QSlider )
    which = kNotch5Q;
```

```
    else if( slider == &m_[redacted]h3BoostSlider )
      which = kNotch5Cut;
    else
      return;

    g_DSPManager->SetParamValue(CONTROL_RANGE-slider->GetPos(),which);
    SendStringToUI(which);

}

void CStWaveRejPage::OnShowWindow(BOOL bShow, UINT nStatus)
{
  CPropertyPage::OnShowWindow(bShow, nStatus);

  // TODO: Add your message handler code here

}

void CStWaveRejPage::OnPaint()
{
  CPaintDC dc(this); // device context for painting

  // TODO: Add your message handler code here
  m_Notch1FreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch3Freq));
  m_Notch1QSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch3Q));
  m_Notch1CutSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch3Cut));

  m_Notch2FreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch4Freq));
  m_Notch2QSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch4Q));
  m_Notch2CutSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch4Cut));

  m_Notch3QSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch5Q));
  m_Notch3BoostSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kNotch5Cut));

  m_BypassButton.SetCheck(g_DSPManager->GetBypassSection(kBypassConecry));
  // Do not call CPropertyPage::OnPaint() for painting messages
}

void CStWaveRejPage::OnBypass()
{
  // TODO: Add your control notification handler code here
  int state = m_BypassButton.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassConecry);

}
```

```
/*

  There a number of blocks (processing units).
  The signal flow is linear currently.
  Each item is an ascii line of text
  The file format is as follows:

  version number

  block type
  number of params for block
  block param #1
  block param #2
  block param #3
  ...
  block param #n

  block type
  number of params for block
  block param #1
  block param #2
  block param #3
  ...
  block param #n

  ...

 */

// file version number
#define BLOB_FILE_VERSION 1

// block type descriptor
typedef enum {
    BLOCK_DELAY,
    BLOCK_GAIN,
    BLOCK_PEQ,
    BLOCK_AP,
    BLOCK_LS,
    BLOCK_HS,
    BLOCK_HP,
    BLOCK_LP,
    BLOCK_LP2
} ProcessType;
```

0107

```
// SPIPEMicroComm.h: interface for the SPIPEMicroComm class.
//
//////////////////////////////////////////////////////////////////////

#if !defined(AFX_SPIPEMICROCOMM_H__33F9EF06_F6EF_11D2_96EE_006097CDB9E2__INCLUDED_)
#define AFX_SPIPEMICROCOMM_H__33F9EF06_F6EF_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000

#include "DSPComm.h"

class SPIPEMicroComm : public DSPComm
{

  int cmd_delay;
  int io_delay;

public:
  SPIPEMicroComm();
  virtual ~SPIPEMicroComm();
  virtual long SendDSPWord(long);
  virtual long SendDSPMemory(char *,long);


};

#endif // !defined(AFX_SPIPEMICROCOMM_H__33F9EF06_F6EF_11D2_96EE_006097CDB9E2__INCLUDED_)
```

0108

```
// SPIPEMicroComm.cpp: implementation of the SPIPEMicroComm class.
//
//////////////////////////////////////////////////////////////////////

#include "stdafx.h"
#include "sa.h"
#include "SPIPEMicroComm.h"

#include "unit_ppi.h"
#include "functs.h"

#ifdef _DEBUG
#undef THIS_FILE
static char THIS_FILE[]=__FILE__;
#define new DEBUG_NEW
#endif

//////////////////////////////////////////////////////////////////////
// Construction/Destruction
//////////////////////////////////////////////////////////////////////

SPIPEMicroComm::SPIPEMicroComm()
{

  cmd_delay = 1000;
  io_delay = 50;

  if( load_dll()==false )
  {
    MessageBox(NULL,"UNIT_PPI not found in the system directory. Fix this and restart application.","Danger, I
anger Will Robinson", MB_OK | MB_ICONSTOP );
  }
  else
  {
    init_port_spi(1);
    set_cmd_delay_cnt_value(cmd_delay);
    set_io_delay_cnt_value(io_delay);
  }


}

SPIPEMicroComm::~SPIPEMicroComm()
{

}

long SPIPEMicroComm::SendDSPWord(long value)
{

  return( spi_xchng24(value) );

}

long SPIPEMicroComm::SendDSPMemory(char *data, long len)
{

  return( 0L );

}
```

0109

```
#if !defined(AFX_SHELVPA[redacted]__6F151624_D84D_11D2_96EE_006097CDB9E[redacted]NCLUDED_)
#define AFX_SHELVPAGE_H__6F151624_D84D_11D2_96EE_006097CDB9E2__INCLUDED_

#if _MSC_VER >= 1000
#pragma once
#endif // _MSC_VER >= 1000
// ShelvPage.h : header file
//

/////////////////////////////////////////////////////////////////////////////
// CShelvPage dialog

class CTabDialog;

class CShelvPage : public CPropertyPage
{
  DECLARE_DYNCREATE(CShelvPage)

// Construction
public:
  CShelvPage();
  ~CShelvPage();

// Dialog Data
  //{{AFX_DATA(CShelvPage)
  enum { IDD = IDD_PP6 };
  CButton m_BypassSecondButton;
  CButton m_BypassFirstButton;
  CSliderCtrl m_HiBoostSlider;
  CSliderCtrl m_HiFreqSlider;
  CSliderCtrl m_LoBoostSlider;
  CSliderCtrl m_LoFreqSlider;
  //}}AFX_DATA


// Overrides
  // ClassWizard generate virtual function overrides
  //{{AFX_VIRTUAL(CShelvPage)
  protected:
  virtual void DoDataExchange(CDataExchange* pDX);    // DDX/DDV support
  //}}AFX_VIRTUAL

// Implementation
protected:
  // Generated message map functions
  //{{AFX_MSG(CShelvPage)
  virtual BOOL OnInitDialog();
  afx_msg void OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar);
  afx_msg void OnShowWindow(BOOL bShow, UINT nStatus);
  afx_msg void OnPaint();
  afx_msg void OnBypassFirst();
  afx_msg void OnBypassSecond();
  //}}AFX_MSG
  DECLARE_MESSAGE_MAP()

  CTabDialog *m_ParentWindow;
  void SendStringToUI(int which);

};

//{{AFX_INSERT_LOCATION}}
// Microsoft Developer Studio will insert additional declarations immediately before the previous line.

#endif // !defined(AFX_SHELVPAGE_H__6F151624_D84D_11D2_96EE_006097CDB9E2__INCLUDED_)
```

0110

```
// ShelvPage.cpp : implementation file
//

#include "stdafx.h"
#include "sa.h"
#include "ShelvPage.h"
#include "TabDialog.h"
#include "DSP56kManager.h"

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CShelvPage property page

IMPLEMENT_DYNCREATE(CShelvPage, CPropertyPage)

CShelvPage::CShelvPage() : CPropertyPage(CShelvPage::IDD)
{
  //{{AFX_DATA_INIT(CShelvPage)
  //}}AFX_DATA_INIT
}

CShelvPage::~CShelvPage()
{
}

void CShelvPage::DoDataExchange(CDataExchange* pDX)
{
  CPropertyPage::DoDataExchange(pDX);
  //{{AFX_DATA_MAP(CShelvPage)
  DDX_Control(pDX, IDC_CHECK3, m_BypassSecondButton);
  DDX_Control(pDX, IDC_CHECK1, m_BypassFirstButton);
  DDX_Control(pDX, IDC_SLIDER6, m_HiBoostSlider);
  DDX_Control(pDX, IDC_SLIDER4, m_HiFreqSlider);
  DDX_Control(pDX, IDC_SLIDER3, m_LoBoostSlider);
  DDX_Control(pDX, IDC_SLIDER1, m_LoFreqSlider);
  //}}AFX_DATA_MAP
}


BEGIN_MESSAGE_MAP(CShelvPage, CPropertyPage)
  //{{AFX_MSG_MAP(CShelvPage)
  ON_WM_VSCROLL()
  ON_WM_SHOWWINDOW()
  ON_WM_PAINT()
  ON_BN_CLICKED(IDC_CHECK1, OnBypassFirst)
  ON_BN_CLICKED(IDC_CHECK3, OnBypassSecond)
  //}}AFX_MSG_MAP
END_MESSAGE_MAP()

/////////////////////////////////////////////////////////////////////////////
// CShelvPage message handlers

BOOL CShelvPage::OnInitDialog()
{
  CPropertyPage::OnInitDialog();

  // TODO: Add extra initialization here
  m_LoFreqSlider.SetRange(0,CONTROL_RANGE);
  m_LoFreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kLoShelfFreq));
  m_LoFreqSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_LoFreqSlider.SetPageSize(PG_CONTROL_AMT);

  m_LoBoostSlider.SetRange(0,CONTROL_RANGE);
  m_LoBoostSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kLoShelfGain));
  m_LoBoostSlider.SetTicFreq((CONTROL_RANGE+1)/16);
  m_LoBoostSlider.SetPageSize(PG_CONTROL_AMT);
```

```
    m_HiFreqSlider.SetRange(0,CONTROL_RANGE);
    m_HiFreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kHiShelfFreq));
    m_HiFreqSlider.SetTicFreq((CONTROL_RANGE+1)/16);
    m_HiFreqSlider.SetPageSize(PG_CONTROL_AMT);

    m_HiBoostSlider.SetRange(0,CONTROL_RANGE);
    m_HiBoostSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kHiShelfGain));
    m_HiBoostSlider.SetTicFreq((CONTROL_RANGE+1)/16);
    m_HiBoostSlider.SetPageSize(PG_CONTROL_AMT);


    m_ParentWindow = (CTabDialog *) GetParent()->GetParent();

    return TRUE;  // return TRUE unless you set the focus to a control
                  // EXCEPTION: OCX Property Pages should return FALSE
}

void CShelvPage::OnVScroll(UINT nSBCode, UINT nPos, CScrollBar* pScrollBar)
{
  // TODO: Add your message handler code here and/or call default
  CSliderCtrl *slider = (CSliderCtrl *)pScrollBar;
  int which;

  CPropertyPage::OnVScroll(nSBCode, nPos, pScrollBar);

  Sleep(50);
  if( slider == &m_LoFreqSlider )
    which = kLoShelfFreq;
  else if( slider == &m_LoBoostSlider )
    which = kLoShelfGain;
  else if( slider == &m_HiFreqSlider )
    which = kHiShelfFreq;
  else if( slider == &m_HiBoostSlider )
    which = kHiShelfGain;
  else
    return;

  g_DSPManager->SetParamValue(CONTROL_RANGE-slider->GetPos(),which);
  SendStringToUI(which);


}

void CShelvPage::SendStringToUI(int which)
{

    CString str;

    g_DSPManager->GetStringValue(which,str);
    m_ParentWindow->SetStatusString(0,str);

}

void CShelvPage::OnShowWindow(BOOL bShow, UINT nStatus)
{
  CPropertyPage::OnShowWindow(bShow, nStatus);

  // TODO: Add your message handler code here

}

void CShelvPage::OnPaint()
{
  CPaintDC dc(this); // device context for painting

  // TODO: Add your message handler code here
  m_LoFreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kLoShelfFreq));
  m_LoBoostSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kLoShelfGain));
  m_HiFreqSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kHiShelfFreq));
  m_HiBoostSlider.SetPos(CONTROL_RANGE-g_DSPManager->GetParamValue(kHiShelfGain));

  m_BypassFirstButton.SetCheck(g_DSPManager->GetBypassSection(kBypassLoshelf));
```

0112

```
  m_BypassSecondButton.S[redacted]eck(g_DSPManager->GetBypassSection(kBy[redacted]sHiShelf));
  // Do not call CPropertyPage::OnPaint() for painting messages
}

void CShelvPage::OnBypassFirst()
{
  // TODO: Add your control notification handler code here
  int state = m_BypassFirstButton.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassLoshelf);

}

void CShelvPage::OnBypassSecond()
{
  // TODO: Add your control notification handler code here
  int state = m_BypassSecondButton.GetState() & 0x3;

  g_DSPManager->SetBypassSection(state,kBypassHiShelf);

}
```

```
//Microsoft Developer Stu[redacted] generated resource script.
//
#include "resource.h"

#define APSTUDIO_READONLY_SYMBOLS
////////////////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 2 resource.
//
#include "afxres.h"

////////////////////////////////////////////////////////////////////////////////
#undef APSTUDIO_READONLY_SYMBOLS

////////////////////////////////////////////////////////////////////////////////
// English (U.S.) resources

#if !defined(AFX_RESOURCE_DLL) || defined(AFX_TARG_ENU)
#ifdef _WIN32
LANGUAGE LANG_ENGLISH, SUBLANG_ENGLISH_US
#pragma code_page(1252)
#endif //_WIN32

#ifdef APSTUDIO_INVOKED
////////////////////////////////////////////////////////////////////////////////
//
// TEXTINCLUDE
//

1 TEXTINCLUDE DISCARDABLE
BEGIN
    "resource.h\0"
END

2 TEXTINCLUDE DISCARDABLE
BEGIN
    "#include ""afxres.h""\r\n"
    "\0"
END

3 TEXTINCLUDE DISCARDABLE
BEGIN
    "#define _AFX_NO_SPLITTER_RESOURCES\r\n"
    "#define _AFX_NO_OLE_RESOURCES\r\n"
    "#define _AFX_NO_TRACKER_RESOURCES\r\n"
    "#define _AFX_NO_PROPERTY_RESOURCES\r\n"
    "\r\n"
    "#if !defined(AFX_RESOURCE_DLL) || defined(AFX_TARG_ENU)\r\n"
    "#ifdef _WIN32\r\n"
    "LANGUAGE 9, 1\r\n"
    "#pragma code_page(1252)\r\n"
    "#endif\r\n"
    "#include ""res\\sa.rc2""  // non-Microsoft Visual C++ edited resources\r\n"
    "#include ""afxres.rc""          // Standard components\r\n"
    "#endif\0"
END

#endif    // APSTUDIO_INVOKED


////////////////////////////////////////////////////////////////////////////////
//
// Icon
//

// Icon with lowest ID value placed first to ensure application icon
// remains consistent on all systems.
IDR_MAINFRAME           ICON    DISCARDABLE     "res\\sa.ico"

////////////////////////////////////////////////////////////////////////////////
//
// Dialog
```

0114

```
//

IDD_ABOUTBOX DIALOG DISCARDABLE  0, 0, 259, 55
STYLE DS_MODALFRAME | WS_POPUP | WS_CAPTION | WS_SYSMENU
CAPTION "About KOJ's Amazing Town Crier"
FONT 8, "MS Sans Serif"
BEGIN
    ICON            IDR_MAINFRAME,IDC_STATIC,11,17,21,20
    LTEXT           "KOJ's Amazing Town Crier Version 1.0",IDC_STATIC,40,10,
                    119,8,SS_NOPREFIX
    LTEXT           "Copyright (C) PMI 1999",IDC_STATIC,40,25,119,8
    DEFPUSHBUTTON   "OK",IDOK,220,7,32,14,WS_GROUP
END

IDD_SA_DIALOG DIALOGEX 0, 0, 229, 175
STYLE DS_MODALFRAME | WS_POPUP | WS_VISIBLE | WS_CAPTION | WS_SYSMENU
EXSTYLE WS_EX_APPWINDOW
CAPTION "SuperAudio"
FONT 8, "MS Sans Serif"
BEGIN
    DEFPUSHBUTTON   "OK",IDOK,172,7,50,14
    PUSHBUTTON      "Cancel",IDCANCEL,172,23,50,14
    PUSHBUTTON      "Poke Sequence #1",IDC_BUTTON1,35,83,109,25
    PUSHBUTTON      "Poke Sequence #2",IDC_BUTTON2,33,123,115,28
END

IDD_DIALOG1 DIALOG DISCARDABLE  0, 0, 236, 229
STYLE DS_MODALFRAME | WS_POPUP | WS_CAPTION | WS_SYSMENU
CAPTION "KOJ's Amazing Town Crier"
MENU IDR_MENU1
FONT 8, "MS Sans Serif"
BEGIN
END

IDD_PP1 DIALOG DISCARDABLE  0, 0, 195, 127
STYLE WS_CHILD | WS_DISABLED | WS_CAPTION
CAPTION "Test"
FONT 8, "MS Sans Serif"
BEGIN
    PUSHBUTTON      "Send SPI Sequence #1",IDC_BUTTON1,57,36,86,22
    PUSHBUTTON      "Send SPI Sequence #2",IDC_BUTTON2,55,81,93,31
END

IDD_PP2 DIALOG DISCARDABLE  0, 0, 288, 146
STYLE WS_CHILD | WS_DISABLED | WS_CAPTION
CAPTION "Main"
FONT 8, "MS Sans Serif"
BEGIN
    CONTROL         "Slider1",IDC_SLIDER1,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,58,25,22,86
    LTEXT           "Pre",IDC_STATIC,28,117,12,8
    CONTROL         "Bypass Processing",IDC_CHECK1,"Button",BS_AUTOCHECKBOX |
                    WS_TABSTOP,173,57,76,10
    CONTROL         "Slider1",IDC_SLIDER3,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,27,25,22,86
    LTEXT           "Post",IDC_STATIC,57,117,15,8
    GROUPBOX        "Volume",IDC_STATIC,19,15,135,118
    CONTROL         "Bypass HDCD",IDC_CHECK2,"Button",BS_AUTOCHECKBOX |
                    WS_TABSTOP,173,74,76,10
    CONTROL         "Bypass HDCD Gain Scale",IDC_CHECK3,"Button",
                    BS_AUTOCHECKBOX | WS_TABSTOP,173,91,98,10
    PUSHBUTTON      "Reset All",IDC_BUTTON1,173,31,50,14
    CONTROL         "Analog Input",IDC_CHECK4,"Button",BS_AUTOCHECKBOX |
                    WS_TABSTOP,173,108,56,10
    CONTROL         "Slider1",IDC_SLIDER7,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,89,25,22,86
    LTEXT           "Analog",IDC_STATIC,85,117,23,8
    CONTROL         "Slider1",IDC_SLIDER8,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,119,25,22,86
    LTEXT           "Delay",IDC_STATIC,117,117,19,8
END
```

```
IDD_PP3 DIALOG DISCARDAB[redacted]0, 0, 195, 127
STYLE WS_CHILD | WS_DISABLED | WS_CAPTION
CAPTION "Compression"
FONT 8, "MS Sans Serif"
BEGIN
    CONTROL         "Bypass Compression",IDC_CHECK1,"Button",BS_AUTOCHECKBOX |
                    WS_TABSTOP,29,24,104,10
END

IDD_PP4 DIALOG DISCARDABLE  0, 0, 244, 159
STYLE WS_CHILD | WS_DISABLED | WS_CAPTION
CAPTION "Resonance Compensation"
FONT 8, "MS Sans Serif"
BEGIN
    CONTROL         "Slider1",IDC_SLIDER1,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,20,24,20,85
    CONTROL         "Slider1",IDC_SLIDER2,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,48,24,21,85
    CONTROL         "Slider1",IDC_SLIDER3,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,76,24,20,85
    LTEXT           "Freq.",IDC_STATIC,17,113,20,11
    LTEXT           "Q",IDC_STATIC,51,113,8,11
    LTEXT           "Cut/Boost",IDC_STATIC,71,113,33,11
    GROUPBOX        "First Notch",IDC_STATIC,11,15,98,111
    CONTROL         "Slider1",IDC_SLIDER4,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,137,24,24,85
    CONTROL         "Slider1",IDC_SLIDER5,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,165,24,21,85
    CONTROL         "Slider1",IDC_SLIDER6,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,193,24,22,85
    LTEXT           "Freq.",IDC_STATIC,135,113,20,11
    LTEXT           "Q",IDC_STATIC,169,113,8,11
    LTEXT           "Cut/Boost",IDC_STATIC,189,113,32,11
    GROUPBOX        "Second Notch",IDC_STATIC,129,15,98,111
    CONTROL         "Bypass",IDC_CHECK5,"Button",BS_AUTOCHECKBOX |
                    WS_TABSTOP,33,136,39,10
    CONTROL         "Bypass",IDC_CHECK6,"Button",BS_AUTOCHECKBOX |
                    WS_TABSTOP,153,136,39,10
END

IDD_PP5 DIALOG DISCARDABLE  0, 0, 339, 162
STYLE WS_CHILD | WS_DISABLED | WS_CAPTION
CAPTION "Standing Wave Rejection"
FONT 8, "MS Sans Serif"
BEGIN
    CONTROL         "Slider1",IDC_SLIDER1,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,20,24,20,85
    CONTROL         "Slider1",IDC_SLIDER2,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,48,24,21,85
    CONTROL         "Slider1",IDC_SLIDER3,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,76,24,20,85
    LTEXT           "Freq.",IDC_STATIC,17,113,20,11
    LTEXT           "Q",IDC_STATIC,51,113,8,11
    LTEXT           "Cut/Boost",IDC_STATIC,70,113,35,11
    GROUPBOX        "First Notch",IDC_STATIC,11,15,98,111
    CONTROL         "Slider1",IDC_SLIDER4,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,229,24,24,85
    CONTROL         "Slider1",IDC_SLIDER5,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,257,24,21,85
    CONTROL         "Slider1",IDC_SLIDER6,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,285,24,22,85
    LTEXT           "Freq.",IDC_STATIC,227,113,20,11
    LTEXT           "Q",IDC_STATIC,261,113,8,11
    LTEXT           "Cut/Boost",IDC_STATIC,280,113,34,11
    GROUPBOX        "Second Notch",IDC_STATIC,221,15,98,111
    CONTROL         "Slider1",IDC_SLIDER8,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,140,25,21,85
    CONTROL         "Slider1",IDC_SLIDER9,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,168,25,22,85
    LTEXT           "Q",IDC_STATIC,144,114,8,11
    LTEXT           "Cut/Boost",IDC_STATIC,163,114,34,11
    GROUPBOX        "Boost Compensation",IDC_STATIC,125,15,77,111
```

```
    CONTROL         "Byp[redacted]IDC_CHECK5,"Button",BS_AUTOCHECKBOX |
                    WS_TA[redacted]OP,146,137,41,10
END

IDD_PP6 DIALOG DISCARDABLE  0, 0, 187, 162
STYLE WS_CHILD | WS_DISABLED | WS_CAPTION
CAPTION "Smiley-Face"
FONT 8, "MS Sans Serif"
BEGIN
    CONTROL         "Slider1",IDC_SLIDER1,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,20,24,20,85
    CONTROL         "Slider1",IDC_SLIDER3,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,50,24,20,85
    LTEXT           "Freq.",-1,17,113,20,11
    LTEXT           "Cut/Boost",-1,43,113,34,11
    GROUPBOX        "Lo-Shelf",-1,11,15,70,111
    CONTROL         "Slider1",IDC_SLIDER4,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,108,24,24,85
    CONTROL         "Slider1",IDC_SLIDER6,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,139,24,22,85
    LTEXT           "Freq.",-1,106,113,20,11
    LTEXT           "Cut/Boost",-1,134,113,33,11
    GROUPBOX        "Hi-Shelf",-1,100,15,69,111
    CONTROL         "Bypass",IDC_CHECK1,"Button",BS_AUTOCHECKBOX |
                    WS_TABSTOP,25,136,37,12
    CONTROL         "Bypass",IDC_CHECK3,"Button",BS_AUTOCHECKBOX |
                    WS_TABSTOP,115,136,37,12
END

IDD_PP7 DIALOG DISCARDABLE  0, 0, 242, 162
STYLE WS_CHILD | WS_DISABLED | WS_CAPTION
CAPTION "Cutoff Response"
FONT 8, "MS Sans Serif"
BEGIN
    CONTROL         "Slider1",IDC_SLIDER1,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,20,24,20,85
    CONTROL         "Slider1",IDC_SLIDER2,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,48,24,21,85
    CONTROL         "Slider1",IDC_SLIDER3,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,76,24,20,85
    LTEXT           "Freq.",IDC_STATIC,17,113,20,11
    LTEXT           "Q",IDC_STATIC,51,113,8,11
    LTEXT           "Cut/Boost",IDC_STATIC,71,113,33,11
    GROUPBOX        "Low Cutoff",IDC_STATIC,11,15,98,111
    CONTROL         "Slider1",IDC_SLIDER4,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,137,24,24,85
    CONTROL         "Slider1",IDC_SLIDER5,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,165,24,21,85
    CONTROL         "Slider1",IDC_SLIDER6,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,193,24,22,85
    LTEXT           "Freq.",IDC_STATIC,135,113,20,11
    LTEXT           "Q",IDC_STATIC,169,113,8,11
    LTEXT           "Cut/Boost",IDC_STATIC,189,113,32,11
    GROUPBOX        "High Cutoff",IDC_STATIC,129,15,98,111
    CONTROL         "Bypass",IDC_CHECK5,"Button",BS_AUTOCHECKBOX |
                    WS_TABSTOP,39,139,41,12
    CONTROL         "Bypass",IDC_CHECK6,"Button",BS_AUTOCHECKBOX |
                    WS_TABSTOP,154,139,41,12
END

IDD_PP8 DIALOG DISCARDABLE  0, 0, 285, 164
STYLE WS_CHILD | WS_DISABLED | WS_CAPTION
CAPTION "Cutoff Response"
FONT 8, "MS Sans Serif"
BEGIN
    CONTROL         "Slider1",IDC_SLIDER1,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,20,24,20,85
    CONTROL         "Slider1",IDC_SLIDER2,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,48,24,21,85
    LTEXT           "Freq.",-1,17,113,20,11
    LTEXT           "Q",-1,51,113,8,11
    GROUPBOX        "Low Cutoff",-1,11,15,71,111
```

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```
        CONTROL         "Slid[redacted],IDC_SLIDER4,"msctls_trackbar32",TBS_[redacted]TICKS |
                        TBS_VERT | WS_TABSTOP,112,24,24,85
        CONTROL         "Slider1",IDC_SLIDER5,"msctls_trackbar32",TBS_AUTOTICKS |
                        TBS_VERT | WS_TABSTOP,140,24,21,85
        LTEXT           "Freq.",-1,110,113,20,11
        LTEXT           "Q",-1,144,113,8,11
        GROUPBOX        "High Cutoff",-1,104,15,69,111
        CONTROL         "Bypass",IDC_CHECK4,"Button",BS_AUTOCHECKBOX |
                        WS_TABSTOP,25,136,40,13
        CONTROL         "Bypass",IDC_CHECK5,"Button",BS_AUTOCHECKBOX |
                        WS_TABSTOP,116,136,40,13
        CONTROL         "Slider1",IDC_SLIDER8,"msctls_trackbar32",TBS_AUTOTICKS |
                        TBS_VERT | WS_TABSTOP,203,25,24,85
        CONTROL         "Slider1",IDC_SLIDER9,"msctls_trackbar32",TBS_AUTOTICKS |
                        TBS_VERT | WS_TABSTOP,231,25,21,85
        LTEXT           "Freq.",-1,201,114,20,11
        LTEXT           "Q",-1,235,114,8,11
        GROUPBOX        "New High Cutoff",-1,195,15,69,111
        CONTROL         "Bypass",IDC_CHECK7,"Button",BS_AUTOCHECKBOX |
                        WS_TABSTOP,207,137,40,13
END

IDD_PP9 DIALOG DISCARDABLE  0, 0, 244, 164
STYLE WS_CHILD | WS_DISABLED | WS_CAPTION
CAPTION "Resonance Compensation #2"
FONT 8, "MS Sans Serif"
BEGIN
        CONTROL         "Slider1",IDC_SLIDER1,"msctls_trackbar32",TBS_AUTOTICKS |
                        TBS_VERT | WS_TABSTOP,20,24,20,85
        CONTROL         "Slider1",IDC_SLIDER2,"msctls_trackbar32",TBS_AUTOTICKS |
                        TBS_VERT | WS_TABSTOP,48,24,21,85
        CONTROL         "Slider1",IDC_SLIDER3,"msctls_trackbar32",TBS_AUTOTICKS |
                        TBS_VERT | WS_TABSTOP,76,24,20,85
        LTEXT           "Freq.",IDC_STATIC,17,113,20,11
        LTEXT           "Q",IDC_STATIC,51,113,8,11
        LTEXT           "Cut/Boost",IDC_STATIC,71,113,33,11
        GROUPBOX        "Third Notch",IDC_STATIC,11,15,98,111
        CONTROL         "Slider1",IDC_SLIDER4,"msctls_trackbar32",TBS_AUTOTICKS |
                        TBS_VERT | WS_TABSTOP,137,24,24,85
        CONTROL         "Slider1",IDC_SLIDER5,"msctls_trackbar32",TBS_AUTOTICKS |
                        TBS_VERT | WS_TABSTOP,165,24,21,85
        CONTROL         "Slider1",IDC_SLIDER6,"msctls_trackbar32",TBS_AUTOTICKS |
                        TBS_VERT | WS_TABSTOP,193,24,22,85
        LTEXT           "Freq.",IDC_STATIC,135,113,20,11
        LTEXT           "Q",IDC_STATIC,169,113,8,11
        LTEXT           "Cut/Boost",IDC_STATIC,189,113,32,11
        GROUPBOX        "Fourth Notch",IDC_STATIC,129,15,98,111
        CONTROL         "Bypass",IDC_CHECK5,"Button",BS_AUTOCHECKBOX |
                        WS_TABSTOP,36,139,40,12
        CONTROL         "Bypass",IDC_CHECK6,"Button",BS_AUTOCHECKBOX |
                        WS_TABSTOP,155,139,40,12
END

IDD_DIALOG2 DIALOG DISCARDABLE  0, 0, 175, 66
STYLE DS_MODALFRAME | WS_POPUP | WS_CAPTION | WS_SYSMENU
CAPTION "Dialog"
FONT 8, "MS Sans Serif"
BEGIN
        PUSHBUTTON      "Cancel",IDCANCEL,59,34,50,14
        LTEXT           "Initializing I2C.  Please Wait.....",IDC_STATIC,43,17,
                        98,8
END

IDD_DIALOG3 DIALOG DISCARDABLE  0, 0, 186, 132
STYLE DS_MODALFRAME | WS_POPUP | WS_CAPTION | WS_SYSMENU
CAPTION "Dialog"
FONT 8, "MS Sans Serif"
BEGIN
        DEFPUSHBUTTON   "OK",IDOK,107,95,50,14
        CONTROL         "COM1",IDC_RADIO1,"Button",BS_AUTORADIOBUTTON,23,57,36,
                        10
        CONTROL         "COM2",IDC_RADIO2,"Button",BS_AUTORADIOBUTTON,23,70,36,
```

```
                    10
    CONTROL         "COM3",IDC_RADIO3,"Button",BS_AUTORADIOBUTTON,23,82,36,
                    10
    CONTROL         "COM4",IDC_RADIO4,"Button",BS_AUTORADIOBUTTON,23,95,36,
                    10
    LTEXT           "Choose COM port and reset DSP board",IDC_STATIC,28,21,
                    125,8
    GROUPBOX        "COM Port",IDC_STATIC,15,45,68,69
END

IDD_DIALOG4 DIALOG DISCARDABLE  0, 0, 186, 121
STYLE DS_MODALFRAME | WS_POPUP | WS_CAPTION | WS_SYSMENU
CAPTION "Dialog"
FONT 8, "MS Sans Serif"
BEGIN
    DEFPUSHBUTTON   "OK",IDOK,27,72,50,14
    PUSHBUTTON      "Quit App",IDC_BUTTON1,101,72,48,14
    LTEXT           "I2C communication error!",IDC_STATIC,49,25,79,8
    EDITTEXT        IDC_EDIT1,49,42,68,12,ES_AUTOHSCROLL
END

IDD_PP10 DIALOG DISCARDABLE  0, 0, 187, 162
STYLE WS_CHILD | WS_DISABLED | WS_CAPTION
CAPTION "Allpass"
FONT 8, "MS Sans Serif"
BEGIN
    CONTROL         "Slider1",IDC_SLIDER1,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,20,24,20,85
    CONTROL         "Slider1",IDC_SLIDER3,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,50,24,20,85
    LTEXT           "Freq.",-1,17,113,20,11
    LTEXT           "Q",-1,53,113,8,8
    GROUPBOX        "Allpass",-1,11,15,70,111
    CONTROL         "Bypass",IDC_CHECK1,"Button",BS_AUTOCHECKBOX |
                    WS_TABSTOP,25,136,37,12
END

IDD_PP11 DIALOG DISCARDABLE  0, 0, 244, 159
STYLE WS_CHILD | WS_DISABLED | WS_CAPTION
CAPTION "Double-Tuned Notch"
FONT 8, "MS Sans Serif"
BEGIN
    CONTROL         "Slider1",IDC_SLIDER1,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,20,24,20,85
    CONTROL         "Slider1",IDC_SLIDER2,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,48,24,21,85
    LTEXT           "Freq.",-1,17,113,20,11
    LTEXT           "Q",-1,51,113,8,11
    GROUPBOX        "Notch",-1,11,15,70,111
    CONTROL         "Slider1",IDC_SLIDER5,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,109,24,21,85
    CONTROL         "Slider1",IDC_SLIDER6,"msctls_trackbar32",TBS_AUTOTICKS |
                    TBS_VERT | WS_TABSTOP,137,24,22,85
    LTEXT           "Q",-1,113,113,8,11
    LTEXT           "Cut/Boost",-1,133,113,32,11
    GROUPBOX        "Compensation",-1,99,15,71,111
    CONTROL         "Bypass",IDC_CHECK5,"Button",BS_AUTOCHECKBOX |
                    WS_TABSTOP,73,136,39,10
END


#ifndef _MAC
//////////////////////////////////////////////////////////////////////////////
//
// Version
//

VS_VERSION_INFO VERSIONINFO
 FILEVERSION 0,7,4,0
 PRODUCTVERSION 0,7,4,0
 FILEFLAGSMASK 0x3fL
#ifdef _DEBUG
```

```
 FILEFLAGS 0x1L
#else
 FILEFLAGS 0x0L
#endif
 FILEOS 0x4L
 FILETYPE 0x1L
 FILESUBTYPE 0x0L
BEGIN
    BLOCK "StringFileInfo"
    BEGIN
        BLOCK "040904b0"
        BEGIN
            VALUE "CompanyName", "Pacific Microsonics Inc.\0"
            VALUE "FileDescription", "sa MFC Application\0"
            VALUE "FileVersion", "0, 7, 4, 0\0"
            VALUE "InternalName", "sa\0"
            VALUE "LegalCopyright", "Copyright (C) PMI 1999\0"
            VALUE "OriginalFilename", "sa.EXE\0"
            VALUE "ProductName", "sa Application\0"
            VALUE "ProductVersion", "0, 7, 4, 0\0"
        END
    END
    BLOCK "VarFileInfo"
    BEGIN
        VALUE "Translation", 0x409, 1200
    END
END

#endif    // !_MAC


/////////////////////////////////////////////////////////////////////////////
//
// DESIGNINFO
//

#ifdef APSTUDIO_INVOKED
GUIDELINES DESIGNINFO DISCARDABLE
BEGIN
    IDD_ABOUTBOX, DIALOG
    BEGIN
        LEFTMARGIN, 7
        RIGHTMARGIN, 252
        TOPMARGIN, 7
        BOTTOMMARGIN, 48
    END

    IDD_SA_DIALOG, DIALOG
    BEGIN
        LEFTMARGIN, 7
        RIGHTMARGIN, 222
        TOPMARGIN, 7
        BOTTOMMARGIN, 168
    END

    IDD_DIALOG1, DIALOG
    BEGIN
        LEFTMARGIN, 7
        RIGHTMARGIN, 229
        TOPMARGIN, 7
        BOTTOMMARGIN, 222
    END

    IDD_PP1, DIALOG
    BEGIN
        LEFTMARGIN, 7
        RIGHTMARGIN, 188
        TOPMARGIN, 7
        BOTTOMMARGIN, 120
    END

    IDD_PP2, DIALOG
```

```
 BEGIN
     LEFTMARGIN, 7
     RIGHTMARGIN, 281
     TOPMARGIN, 7
     BOTTOMMARGIN, 139
 END

 IDD_PP3, DIALOG
 BEGIN
     LEFTMARGIN, 7
     RIGHTMARGIN, 188
     TOPMARGIN, 7
     BOTTOMMARGIN, 120
 END

 IDD_PP4, DIALOG
 BEGIN
     LEFTMARGIN, 7
     RIGHTMARGIN, 237
     TOPMARGIN, 7
     BOTTOMMARGIN, 152
 END

 IDD_PP5, DIALOG
 BEGIN
     LEFTMARGIN, 7
     RIGHTMARGIN, 332
     TOPMARGIN, 7
     BOTTOMMARGIN, 155
 END

 IDD_PP6, DIALOG
 BEGIN
     LEFTMARGIN, 7
     RIGHTMARGIN, 180
     TOPMARGIN, 7
     BOTTOMMARGIN, 155
 END

 IDD_PP7, DIALOG
 BEGIN
     LEFTMARGIN, 7
     RIGHTMARGIN, 235
     TOPMARGIN, 7
     BOTTOMMARGIN, 155
 END

 IDD_PP8, DIALOG
 BEGIN
     LEFTMARGIN, 7
     RIGHTMARGIN, 278
     TOPMARGIN, 7
     BOTTOMMARGIN, 157
 END

 IDD_PP9, DIALOG
 BEGIN
     LEFTMARGIN, 7
     RIGHTMARGIN, 237
     TOPMARGIN, 7
     BOTTOMMARGIN, 157
 END

 IDD_DIALOG2, DIALOG
 BEGIN
     LEFTMARGIN, 7
     RIGHTMARGIN, 168
     TOPMARGIN, 7
     BOTTOMMARGIN, 59
 END

 IDD_DIALOG3, DIALOG
```

```
    BEGIN
        LEFTMARGIN, 7
        RIGHTMARGIN, 179
        TOPMARGIN, 7
        BOTTOMMARGIN, 125
    END

    IDD_DIALOG4, DIALOG
    BEGIN
        LEFTMARGIN, 7
        RIGHTMARGIN, 179
        TOPMARGIN, 7
        BOTTOMMARGIN, 114
    END

    IDD_PP10, DIALOG
    BEGIN
        LEFTMARGIN, 7
        RIGHTMARGIN, 180
        TOPMARGIN, 7
        BOTTOMMARGIN, 155
    END

    IDD_PP11, DIALOG
    BEGIN
        LEFTMARGIN, 7
        RIGHTMARGIN, 237
        TOPMARGIN, 7
        BOTTOMMARGIN, 152
    END
END
#endif    // APSTUDIO_INVOKED


////////////////////////////////////////////////////////////////////////////
//
// Menu
//

IDR_MENU1 MENU DISCARDABLE
BEGIN
    POPUP "File"
    BEGIN
        MENUITEM "Open",                        ID_MENUITEM32771
        MENUITEM "Save",                        ID_MENUITEM32772
        MENUITEM "Export Param File",           ID_FILE_EXPORTPARAMFILE
    END
END


////////////////////////////////////////////////////////////////////////////
//
// String Table
//

STRINGTABLE DISCARDABLE
BEGIN
    IDS_ABOUTBOX            "&About KOJ's Amazing Town Crier..."
END

#endif    // English (U.S.) resources
////////////////////////////////////////////////////////////////////////////


#ifndef APSTUDIO_INVOKED
////////////////////////////////////////////////////////////////////////////
//
// Generated from the TEXTINCLUDE 3 resource.
//
#define _AFX_NO_SPLITTER_RESOURCES
#define _AFX_NO_OLE_RESOURCES
```

```
#define _AFX_NO_TRACKER_[redacted]URCES
#define _AFX_NO_PROPERTY_RESOURCES

#if !defined(AFX_RESOURCE_DLL) || defined(AFX_TARG_ENU)
#ifdef _WIN32
LANGUAGE 9, 1
#pragma code_page(1252)
#endif
#include "res\sa.rc2"  // non-Microsoft Visual C++ edited resources
#include "afxres.rc"         // Standard components
#endif
/////////////////////////////////////////////////////////////////////////////
#endif    // not APSTUDIO_INVOKED
```

```
        opt     cc,cex,cre,loc,so,mu,mex

    DEFINE          FAST    '1'
    DEFINE          MS6362  '1'

TABLE_COUNTER   EQU 10
RUN_COUNTER     EQU 10
INIT_COUNTER    EQU 10

    org y(10):$100
    org p(10):$980

; ************************************************************
; ************************************************************

    SECTION     SUPER

; ************************************************************
; ************************************************************

;------------------------------------------------------------
; HDCD detect and expand code
;------------------------------------------------------------

        include 'detect.asm'
        include 'expgain.asm'

;*****************************************************************************
;
;   Adopted from Motorola sample code.
;
;*****************************************************************************
                page    132,60
                include 'ioequ.asm'
                include 'vectors.asm'
;               include 'mbiquad.asm'
                include 'mpeq.asm'
                include 'mshelv.asm'
                include 'mhipass.asm'
                include 'mlopass.asm'
                include 'allpass.asm'
                list

CONFIGURE_SPI   MACRO

;   move    #0,x0
;   move    x0,X:M_HSAR                     ; clear I2C address

    ; M_HCKR
    ; bits 13:12 HFM1:0 noise filter setting (off)
    ; bit 1 CPOL
    ; bit 0 CPHA
    ;
    ; 00 xxxx xxxx xx01
;   move    #1,x0
;   move    #0,x0
;   move    x0,X:M_HCKR
;   commented out code should yeild a value of 0 for M_HCKR.

    ; M_HCSR
    ; bit 13:12 HCSR HRIE
    ; bit 11 HCSR HTIE
    ; bit 10 HCSR HBIE
    ; bit 9 HCSR Idle (no care)
    ; bit 8:7 HRQE Host-request enable (asserted if ready to receive)
    ; bit 6 HMST Master mode (disabled)
    ; bit 5 HFIFO FIFO control (disabled)
    ; bit 4 HCKFR Clock freeze (off)
    ; bit 3:2 HM1:0 24 bit mode
    ; bit 1 HI2C Enables I2C mode
    ; bit 0 HEN Enable port
```

```
        ;
        ; xx01 0010 000x 1001
        move    #$1209,x0
        move    x0,X:M_HCSR

        ; set command to known value
        move    #SPITXDEF,x0
        move    x0,x:spixmit
;       movep   x:spixmit,x:M_HTX

        ENDM

CONFIGURE_I2C   MACRO

        ; turn off port
        move    #0,x0
        move    x0,X:M_HCSR

        ; leave address alone
;       move    #0,x0
;       move    x0,X:M_HSAR                     ; clear I2C address

;       commented out code should yeild a value of 0 for M_HCKR.
        ; M_HCKR
        ; bits 13:12 HFM1:0 noise filter setting on
        ;
        ; 11 xxxx xxxx xx00
        move    #>$3000,x0
        move    x0,X:M_HCKR

        ; M_HCSR
        ; bit 13:12 HCSR HRIE
        ; bit 11 HCSR HTIE
        ; bit 10 HCSR HBIE
        ; bit 9 HCSR Idle (no care)
        ; bit 8:7 HRQE Host-request enable (asserted if ready to receive)
        ; bit 6 HMST Master mode (disabled)
        ; bit 5 HFIFO FIFO control (disabled)
        ; bit 4 HCKFR Clock freeze (off)
        ; bit 3:2 HM1:0 24 bit mode
        ; bit 1 HI2C Enables I2C mode
        ; bit 0 HEN Enable port
        ;
        ; xx01 1100 101x 1010
        move    #$1CAA,x0
        move    x0,X:M_HCSR

        ; set command to known value
        move    #0,x0
        move    x0,x:spixmit
;       movep   x:spixmit,x:M_HTX

        ENDM

        XDEF        fcontrol
        XREF        HDCD_DETECT_INIT,HDCD_DETECT,lsbcntl
        XREF        ltemp,rtemp
        XREF        dcontrol
        XREF        HDCD_GAIN_INIT,HDCD_DYNAMICS
        XREF        detect
        XREF        rmodel,bitcntl

SPITXDEF    equ     $444444

        org     xi:
DRX_BUFF_BASE   ds  2
ARX_BUFF_BASE   ds  2

TX_BUFF_BASE    ds  4       ; unprocessed followed by processed data

;RX_PTR     ds  1
TX_PTR      ds  1
```

```
flags       ds  1
scnt        ds  1
RightReceive    equ     0
SPIReceive      equ     1
SPIOverrun      equ     2
SPIFIFOFull     equ     3
SPIUnderrun     equ     4
SPITransmit     equ     5
SPIStateBit     equ     6

spixmit     ds  1
spirecv     ds  1
shisaveA1   ds  1
shisaveX0   ds  1
shisaveR4   ds  1
shisaveN4   ds  1
NADA        ds  1
left        ds  1
right       ds  1
fcontrol    ds  1
indexData   ds  1
dpleft      ds  1
dpright     ds  1
stack       ds  20

; interleaved delay line
; independently located
    org x(20):$200
DELAYLEN    EQU 128                 ; 2.9 mS delay line
sdelayleft      dsm DELAYLEN        ; left
sdelayright     dsm DELAYLEN        ; right

    org yi:
YNADA       ds  1
volume      ds  1
prefader    ds  1
bypass      ds  1
hdcdbp      ds  1
gainscalebp ds  1
ddxcompbp   ds  1
analogin    ds  1
avolume     ds  1
bypassmask  ds  1

BYPASS_NOTCH1   EQU 0
BYPASS_NOTCH2   EQU 1
BYPASS_NOTCH3   EQU 2
BYPASS_NOTCH4   EQU 3
BYPASS_HIPASS   EQU 4
BYPASS_LOPASS   EQU 5
BYPASS_LOSHELV  EQU 6
BYPASS_HISHELV  EQU 7
BYPASS_CONECRY  EQU 8
BYPASS_ALLPASS  EQU 9
BYPASS_DBNOTCH  EQU 10
BYPASS_NLOPASS  EQU 11

delayval    ds  1

; ********************************************
;   EQ/filter declarations
; ********************************************
; smiley face shelf EQ
    ; left channel
    DECLARE_LSH 1L,1.,-0.867
    DECLARE_HSH 2L,1.,-0.867

    ; right channel
    DECLARE_LSH 1R,1.,-0.867
    DECLARE_HSH 2R,1.,-0.867

; resonance compensation PEQ
```

```
        ; left channel
        DECLARE_PEQ 1L,1.,-0.9510565,0.7265425
        DECLARE_PEQ 2L,1.,-0.91,0.5

        DECLARE_PEQ 6L,1.,-0.9510565,0.7265425
        DECLARE_PEQ 7L,1.,-0.91,0.5

        ; right channel
        DECLARE_PEQ 1R,1.,-0.91,0.5
        DECLARE_PEQ 2R,1.,-0.91,0.5

        DECLARE_PEQ 6R,1.,-0.9510565,0.7265425
        DECLARE_PEQ 7R,1.,-0.91,0.5

    ; standing wave rejection PEQ
        ; left channel
        DECLARE_PEQ 3L,1.,-0.9999803,0.9937365
        DECLARE_PEQ 4L,1.,-0.91,0.5
        DECLARE_PEQ 5L,1.,-0.91,0.5

        ; right channel
        DECLARE_PEQ 3R,1.,-0.9999803,0.9937365
        DECLARE_PEQ 4R,1.,-0.91,0.5
        DECLARE_PEQ 5R,1.,-0.91,0.5

    ; hi and lo pass filters
        ; left
        DECLARE_HP  hpleft,0.0099733,0.25,0.9987285          ; 70 Hz
        DECLARE_LP  lpleft,1.1921856,0.6303886,1.4112871     ; 14000 Hz / q = 0.22

        ; right
        DECLARE_HP  hpright,0.0099733,0.25,0.9987285         ; 70 Hz
        DECLARE_LP  lpright,1.1921856,0.6303886,1.4112871    ; 14000 Hz

        ; new lopass
        ; left
        DECLARE_LP  lpleft2,1.,0.,0.
        ; right
        DECLARE_LP  lpright2,1.,0.,0.

    ; allpass  filters
        DECLARE_AP  apleft,-0.91,0.5
        DECLARE_AP  apright,-0.91,0.5


    ; Keith new notch with 2 gain around it.
        DECLARE_PEQ NT1L,1.,-0.9999803,0.9937365
        DECLARE_PEQ NT2L,1.,-0.91,0.5
        DECLARE_PEQ NT3L,1.,-0.91,0.5

        DECLARE_PEQ NT1R,1.,-0.9999803,0.9937365
        DECLARE_PEQ NT2R,1.,-0.91,0.5
        DECLARE_PEQ NT3R,1.,-0.91,0.5

;*****************************************************************************

        org     p:$100
START
main

        ori     #$03,mr                 ; mask interrupts
        movep   #$05000B,X:M_PCTL       ;
        move    #0,omr
        movec   #0,sp                   ; reset hardware stack pointer
;        movep   #$000003,x:M_IPRP      ; ESAI int's enabled and top Priority
        movep   #$000007,x:M_IPRP       ; SHI (1) and ESAI (2) int's enabled
        move    #stack,r6               ; initialize stack pointer
        move    #-1,m6                  ; linear addressing

        move    #0,x0
        move    x0,x:DRX_BUFF_BASE
        move    x0,x:DRX_BUFF_BASE+1
        move    x0,x:ARX_BUFF_BASE
```


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```
move    x0,x:A[redacted]UFF_BASE+1
move    x0,x:TX_BUFF_BASE
move    x0,x:TX_BUFF_BASE+1
move    x0,x:TX_BUFF_BASE+2
move    x0,x:TX_BUFF_BASE+3

clr     a
move    a,x:flags
move    a,x:scnt

; HDCD decoder initialize
move    #>1,x0
move    x0,x:fcontrol
move    #>16,x0
move    x0,x:lsbcntl
jsr     HDCD_DETECT_INIT
move    #>1,x0
move    x0,x:dcontrol
jsr     HDCD_GAIN_INIT

move    #-1,m0
move    #-1,m1
move    #-1,m2
move    #-1,m3
move    #-1,m4
move    #-1,m5
move    #-1,m6
move    #-1,m7

; set up volume and bypass switches
; output volume is set to zero so that filter parameters can
; be downloaded, followed by volume being set

move    #>$800000,x0
move    x0,y:volume
move    x0,y:prefader
move    x0,y:avolume
move    #>$7FFFFF,x0
move    x0,y:bypass
move    #>$0,x0
move    x0,y:hdcdbp
move    x0,y:gainscalebp
move    x0,y:ddxcompbp
move    x0,y:analogin
move    x0,y:bypassmask
move    x0,y:delayval
move    x0,x:indexData

move    #>sdelayleft,x0
move    x0,x:dpleft
move    #>sdelayright,x0
move    x0,x:dpright

; initialize EQ params
INIT_PEQ_PARAM 1L
INIT_PEQ_PARAM 1R
INIT_PEQ_PARAM 2L
INIT_PEQ_PARAM 2R
INIT_PEQ_PARAM 3L
INIT_PEQ_PARAM 3R
INIT_PEQ_PARAM 4L
INIT_PEQ_PARAM 4R
INIT_PEQ_PARAM 5L
INIT_PEQ_PARAM 5R
INIT_PEQ_PARAM 6L
INIT_PEQ_PARAM 6R
INIT_PEQ_PARAM 7L
INIT_PEQ_PARAM 7R

INIT_PEQ_PARAM  NT1L
INIT_PEQ_PARAM  NT2L
INIT_PEQ_PARAM  NT3L
```

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```
INIT_PEQ_PARA    NT1R
INIT_PEQ_PARAM   NT2R
INIT_PEQ_PARAM   NT3R

INIT_SH_PARAM    1L
INIT_SH_PARAM    1R
INIT_SH_PARAM    2L
INIT_SH_PARAM    2R

INIT_LP_PARAM    lpleft
INIT_LP_PARAM    lpright

INIT_LP2_PARAM   lpleft2
INIT_LP2_PARAM   lpright2

INIT_AP_PARAM apleft
INIT_AP_PARAM apright

    ; hi-pass does not need initializing as all params are downloaded
```

```
        ; setup serial host interface
        ;; CONFIGURE_SPI
        CONFIGURE_I2C

;-------------------------------------------------------------
; FST/FSR and SCKT/SCKR are generated from the PLD
; and fed to the DSP, A/D and D/A converters
;-------------------------------------------------------------

;put esai in reset state.
;       IF  @DEF('ANALOGIN')==0
        movep   #$000000,x:M_PCRC       ; MLS 12/20/97
        movep   #$000000,x:M_PRRC       ; MLS 12/20/97
;       ENDIF


        movep   #$0c0200,x:M_TCCR
                ;FST is input                                    (bit22=0)
                ;external clock source drives SCKT               (bit21=0)
                ;negative FST polarity                           (bit19=1)
                ;data & FST clocked out on rising edge           (bit18=1)
                ;2 words per frame                               (bit13:9=00001)


        movep   #$0c0200,x:M_RCCR
                ;FSR is input                                    (bit22=0)
                ;external clock source drives SCKR               (bit21=0)
                ;negative FSR polarity                           (bit19=1)
                ;data & FSR clocked in on rising edge            (bit18=0)BAK(121997)
                ;2 words per frame                               (bit13:9=00001)

        movep   #$000000,x:M_SAICR
```

```
        movep   #$d17[redacted]x:M_RCR                          [redacted]
                ;RX1, RX0 enabled                               (bit1:0=11)
                ;RX2, RX3 disabled                              (bit3:2=00)
                ;reserved                                       (bit5:4=00)
                ;MSB shifted first                              (bit6=0)
                ;word left-aligned                              (bit7=0)
                ;network mode                                   (bit9:8=01)
                ;32-bit slot length, 24-bit word length        (bit14:10=11111)
                ;word-length frame sync                         (bit15=0)
                ;frame sync occurs 1 clock cycle earlier        (bit16=1)
                ;reserved                                       (bit19:17=000)
                ;RLIE, RIE, REIE enabled                        (bit23:20=0101)
                ;bit23 RLIE
                ;bit22 RIE
                ;bit21 REDIE
                ;bit20 REIE

        movep   #$d13d00,x:M_TCR                                ;MLS 12/20/97
                ;TX0, TX1 enabled                               (bit3:0=0011)
                ;TX2, TX3, TX4, TX5 disabled                    (bit5:4=00)
                ;MSB shifted first                              (bit6=0)
                ;word left-aligned                              (bit7=0)
                ;network mode                                   (bit9:8=01)
                ;32-bit slot length, 24-bit word length        (bit14:10=11111)
                ;word length frame sync                         (bit15=0)
                ;frame sync occurs 1 clock cycle earlier        (bit16=0)
                ;reserved                                       (bit19:17=000)
                ;TLIE, TIE, TEIE enabled                        (bit23:20=0101)
                ;bit23 TLIE
                ;bit22 TIE
                ;bit21 TEDIE
                ;bit20 TEIE

        movep   #$000edb,x:M_PCRC       ; MLS 12/20/97
        movep   #$000edb,x:M_PRRC       ; MLS 12/20/97

        movep   #$ffffff,x:M_RSMA       ;MLS 12/20/97
        movep   #$ffffff,x:M_RSMB       ;MLS 12/20/97

        movep   #$000003,x:M_TSMA
        movep   #$000003,x:M_TSMB
        movep   #$000000,x:M_TX0        ;zero out transmitter 0
        movep   #$000000,x:M_TX1        ;zero out transmitter 1
        movep   #$000000,x:M_TX2        ;zero out transmitter 2
        movep   #$000000,x:M_TX3        ;zero out transmitter 3
        bset    #0,x:M_TCR              ;now enable TX0
        bset    #1,x:M_TCR              ;now enable TX1
        bset    #2,x:M_TCR              ;now enable TX2
        bset    #3,x:M_TCR              ;now enable TX3
        bset    #2,x:M_RCR              ;RE2 and TE3 must be set to enable
                                        ;TX3 and disable RX2

        ; turn on serial host interface
        bset    #0,X:M_HCSR

        andi    #$FC,mr                 ;enable all interrupt levels
                                        ;clear scaling bits

        bclr    #RightReceive,X:flags

;       jclr    #RightReceive,X:flags,*
;       bclr    #RightReceive,X:flags
;       jclr    #RightReceive,X:flags,*
;        move    #>RX_BUFF_BASE,x0
;        move    x0,x:RX_PTR
;        move    #>TX_BUFF_BASE,x0
;        move    x0,x:TX_PTR

;-------------------------------------------------------------
; Main loop
;-------------------------------------------------------------
LOOP
```

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```
        jclr    #RightReceive,X:flags,*
        bclr    #RightReceive,X:flags

        btst    #22,y:analogin
        .IF     <CC>
            move    x:DRX_BUFF_BASE,x0          ;receive left
            move    x:DRX_BUFF_BASE+1,x1        ;receive right
        .ELSE
            move    x:ARX_BUFF_BASE,x0          ;receive left
            move    x:ARX_BUFF_BASE+1,x1        ;receive right
        .ENDI

        ; store unprocessed (with volume) output first
        move    y:avolume,y0
        mpyr    y0,x0,a
        mpyr    y0,x1,b
        ; MM 5/20/99 Swapped channels
        tfr     x0,a    a,x:TX_BUFF_BASE+2      ;transmit left
        tfr     x1,b    b,x:TX_BUFF_BASE        ;transmit right

        ; write input into delay line
        move    #DELAYLEN-1,m0
        move    #DELAYLEN-1,m1
        move    x:dpleft,r0
        move    x:dpright,r1
        move    y:delayval,y0
        move    #>DELAYLEN,x0
        mpy     x0,y0,a     a,x:(r0)-
        move                b,x:(r1)-
        move    a,n0
        move    a,n1
        move                x:(r0+n0),a
        move                x:(r1+n1),b
        move    #-1,m0
        move    #-1,m1
        move    r0,x:dpleft
        move    r1,x:dpright

        JSR     STEREO_PROCESS

        ; MM 5/20/99 Swapped channels
        move    b,x:TX_BUFF_BASE+1          ;transmit left
        move    a,x:TX_BUFF_BASE+3          ;transmit right

        move    #>1,x0
        move    x:scnt,a
        add     x0,a
        move    a1,x:scnt                   ; don't saturate

        jmp     LOOP


;---------------------------------------------------------------
; Subroutines
;---------------------------------------------------------------
STEREO_PROCESS

        move        a,x:left
        move        b,x:right

        ; copy parameters from left channel EQs to right channel EQs
        COPY_SH_PARAM   1L,1R
        COPY_SH_PARAM   2L,2R

        COPY_PEQ_PARAM  1L,1R
        COPY_PEQ_PARAM  2L,2R
        COPY_PEQ_PARAM  3L,3R
        COPY_PEQ_PARAM  4L,4R
        COPY_PEQ_PARAM  5L,5R
        COPY_PEQ_PARAM  6L,6R
        COPY_PEQ_PARAM  7L,7R
```

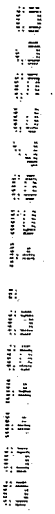
```
        COPY_PEQ_PARA     T1L,NT1R
        COPY_PEQ_PARAM    NT2L,NT2R
        COPY_PEQ_PARAM    NT3L,NT3R

        COPY_HP_PARAM     hpleft,hpright
        COPY_LP_PARAM     lpleft,lpright
        COPY_LP_PARAM     lpleft2,lpright2

        COPY_AP_PARAM     apleft,apright

        ; HDCD processing
;;      jset              #22,y:hdcdbp,doeq

        move              x:left,a
        move              x:right,b
        move              a,x:ltemp
        move              b,x:rtemp

        clr b
        move              #>1,x0
        move              y:gainscalebp,a
        tst               a
        teq               x0,b
        move              b1,x:dcontrol

        jsr               HDCD_DETECT

        ; destroy code
        move              #>3,x0
        move              x:rmodel,a
        cmp               x0,a
        bne               skip_code_dest
        move              #>8,x0
        move              x:bitcntl,a
        cmp               x0,a
        bne               skip_code_dest

        move              x:ltemp,a
        eor               #>$000100,a
        move              a,x:ltemp
        move              a,x:left

skip_code_dest:

        move              #-1,m0
        move              #-1,m4
        move              #4,n4
        jsr               HDCD_DYNAMICS

        move              x:ltemp,a
        move              x:rtemp,b
        btst              #22,y:hdcdbp
        .IF      <CC>
            move              a,x:left
            move              b,x:right
            move          x:detect,x0
            move          x0,x:spixmit
        .ELSE
            move          #0,x0
            move          x0,x:spixmit
        .ENDI
;       jmp               doeq1

;doeq:
;
;       move      #0,x0
;       move      x0,x:spixmit

doeq1:
        jset              #22,y:bypass,dopostvol

        move              x:left,x1
```

```
        move        x:right,y1
        move    y:prefader,x0
        mpyr    -x0,x1,a
        mpyr    -x0,y1,b

        tfr     a,b     b,x:right

        ; smiley face
        jset    #BYPASS_LOSHELV,y:bypassmask,_skiplsl
        LSH 1L
_skiplsl
        jset    #BYPASS_HISHELV,y:bypassmask,_skiphsl
        HSH 2L
_skiphsl
        ; cut-off response
        jset    #BYPASS_HIPASS,y:bypassmask,_skiphpl
        HP  hpleft
_skiphpl
        jset    #BYPASS_LOPASS,y:bypassmask,_skiplpl
        LP  lpleft
_skiplpl
        jset    #BYPASS_NLOPASS,y:bypassmask,_skiplp2l
        LP  lpleft2
_skiplp2l
        ; resonance EQ
        jset    #BYPASS_NOTCH1,y:bypassmask,_skip1l
        PEQ 1L
_skip1l
        jset    #BYPASS_NOTCH2,y:bypassmask,_skip2l
        PEQ 2L
_skip2l
        jset    #BYPASS_NOTCH3,y:bypassmask,_skip3l
        PEQ 6L
_skip3l
        jset    #BYPASS_NOTCH4,y:bypassmask,_skip4l
        PEQ 7L
_skip4l
        ; cone-cry
        jset    #BYPASS_CONECRY,y:bypassmask,_skipccl
        PEQ 5L
        PEQ 3L
        PEQ 4L
_skipccl
        ; double-tuned notch
        jset    #BYPASS_DBNOTCH,y:bypassmask,_skipdbnl
        PEQ NT1L
        PEQ NT2L
        PEQ NT3L
_skipdbnl
        ; all-pass
        jset    #BYPASS_ALLPASS,y:bypassmask,_skipapl
        AP  apleft
_skipapl

        move        b,x:left
        move        x:right,b

        ; smiley face
        jset    #BYPASS_LOSHELV,y:bypassmask,_skiplsr
        LSH 1R
_skiplsr
        jset    #BYPASS_HISHELV,y:bypassmask,_skiphsr
        HSH 2R
_skiphsr
        ; cut-off response
        jset    #BYPASS_HIPASS,y:bypassmask,_skiphpr
        HP  hpright
_skiphpr
        jset    #BYPASS_LOPASS,y:bypassmask,_skiplpr
        LP  lpright
_skiplpr
        jset    #BYPASS_NLOPASS,y:bypassmask,_skiplp2r
```

```
        LP  lpright2
_skiplp2r
        ; resonance EQ
        jset    #BYPASS_NOTCH1,y:bypassmask,_skip1r
        PEQ 1R
_skip1r
        jset    #BYPASS_NOTCH2,y:bypassmask,_skip2r
        PEQ 2R
_skip2r
        jset    #BYPASS_NOTCH3,y:bypassmask,_skip3r
        PEQ 6R
_skip3r
        jset    #BYPASS_NOTCH4,y:bypassmask,_skip4r
        PEQ 7R
_skip4r
        ; cone-cry
        jset    #BYPASS_CONECRY,y:bypassmask,_skipccr
        PEQ 5R
        PEQ 3R
        PEQ 4R
_skipccr
        ; double-tuned notch
        jset    #BYPASS_DBNOTCH,y:bypassmask,_skipdbnr
        PEQ NT1R
        PEQ NT2R
        PEQ NT3R
_skipdbnr
        ; all-pass
        jset    #BYPASS_ALLPASS,y:bypassmask,_skipapr
        AP  apright
_skipapr
        move        b,x:right

dopostvol:
```

```
plainvol:

        move    y:volume,y0
        move    x:left,x0
        move    x:right,x1
        mpyr    -x0,y0,a
        mpyr    -x1,y0,b
        rts
```

```
        org xi:



        org yi:

        org p:
```



```
;-------------------------------------------------------------
; SHI interrupts
;-------------------------------------------------------------

;    ; ---- SHI/I2C receive ISR
shi_rx_isr
        move    a1,x:shisaveA1
        move    x0,x:shisaveX0
        move    r4,x:shisaveR4
        move    n4,x:shisaveN4
        movep   x:M_HRX,a1
        jset    #SPIStateBit,x:flags,_gotData

        ; got index
        move    a1,x:indexData
        bset    #SPIStateBit,x:flags
        jmp     _exitInt

        ; got data
_gotData:
        move    x:indexData,n4
        move    #pptrs,r4
```

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```
        bclr    #SPIStateBit,x:flags
        movem   p:(r4+n4),r4
        move    a1,y:(r4)

_exitInt:
        move    x:shisaveA1,a1
        move    x:shisaveX0,x0
        move    x:shisaveR4,r4
        move    x:shisaveN4,n4
        rti

    ; ---- SHI/I2C receive overrun error
shi_rxe_isr
        movep   x:M_HCSR,x:NADA
        movep   x:M_HRX,x:NADA
        bset    #SPIOverrun,x:flags
        bclr    #SPIStateBit,x:flags
        rti

    ;   SHI Receive FIFO Full
shi_rxf_isr
        movep   x:M_HCSR,x:NADA
        movep   x:M_HRX,x:NADA
        bset    #SPIFIFOFull,x:flags
        bclr    #SPIStateBit,x:flags
        rti

    ;  SHI Transmit Data
shi_txu_isr                         ;SHI Transmit Underrun Error
        bset    #SPIUnderrun,x:flags
        movep   x:M_HCSR,x:NADA
        movep   x:spixmit,x:M_HTX
        bclr    #SPIStateBit,x:flags
        rti

shi_tx_isr:
        movep   x:spixmit,x:M_HTX
        bset    #SPITransmit,x:flags
        rti

      ;SHI Bus Error
shi_bus_error:
;       movep   x:M_HCSR,x:NADA
;       bset    #SPIReceive+4,x:flags
        ; reset shi
        bclr    #0,x:M_HCSR
        nop
        nop
        bset    #0,x:M_HCSR
        bclr    #SPIStateBit,x:flags
        nop
        rti

;-------------------------------------------------------------
; Subroutines
;-------------------------------------------------------------
;               include 'isr_dig.asm'

;-------------------------------------------------------------
; Interrupt Service Routines
;-------------------------------------------------------------

esai_txe_isr                            ; ESAI TRANSMIT ISR
        bclr    #14,x:M_SAISR           ; Read SAISR to clear transmit
esai_tx_isr                             ; underrun error flag

        jset    #13,x:M_SAISR,TxLeftSlot

        movep   x:TX_BUFF_BASE+2,x:M_TX1        ; write unprocessed data
        movep   x:TX_BUFF_BASE+3,x:M_TX0
        movep   x:TX_BUFF_BASE+3,x:M_TX2
```

```
        movep   x:TX_BUFF_BASE+3,x:M_TX3
        rti

TxLeftSlot

        movep   x:TX_BUFF_BASE,x:M_TX1          ; write unprocessed data
        movep   x:TX_BUFF_BASE+1,x:M_TX0
        movep   x:TX_BUFF_BASE+1,x:M_TX2
        movep   x:TX_BUFF_BASE+1,x:M_TX3
        rti

esai_txls_isr                                   ; ESAI TRANSMIT LAST SLOT ISR
;       move    r0,x:(r6)+                      ; Save r0 to the stack
;       move    #TX_BUFF_BASE,r0                ; Reset pointer
;       move    r0,x:TX_PTR                     ; Reset tx buffer pointer just in
;                                               ; case it was corrupted
;       move    x:-(r6),r0                      ; Restore r0
        rti

esai_rxe_isr                                    ; ESAI RECEIVE ISR
        bclr    #7,x:M_SAISR                    ; Read SAISR to clear receive
overrun error flag

esai_rx_isr                                     ; overrun error flag

        jset    #$6,x:M_SAISR,LeftSlot
        bset    #RightReceive,x:flags   ; if right channel data then set flag
        movep   x:M_RX0,x:ARX_BUFF_BASE+1
        movep   x:M_RX1,x:DRX_BUFF_BASE+1
        rti

LeftSlot
        movep   x:M_RX0,x:ARX_BUFF_BASE
        movep   x:M_RX1,x:DRX_BUFF_BASE
        rti

esai_rxls_isr                                   ; ESAI RECEIVE LAST SLOT ISR
;       move    r0,x:(r6)+                      ; Save r0 to the stack
;       move    #RX_BUFF_BASE,r0                ; Reset rx buffer pointer just in
;                                               ; case it was corrupted
;       move    r0,x:RX_PTR                     ; Update rx buffer pointer
;       move    x:-(r6),r0                      ; Restore r0
        rti

;   variable look up table

pptrs
    dc  volume
    dc  sh_gamma_1L
    dc  sh_k_1L
    dc  sh_gamma_2L
    dc  sh_k_2L
    dc  peq_gamma_1L
    dc  peq_beta_1L
    dc  peq_k_1L
    dc  peq_gamma_2L
    dc  peq_beta_2L
    dc  peq_k_2L
    dc  peq_gamma_3L
    dc  peq_beta_3L
    dc  peq_k_3L
    dc  peq_gamma_4L
    dc  peq_beta_4L
    dc  peq_k_4L
    dc  peq_gamma_5L
    dc  peq_beta_5L
    dc  peq_k_5L
    dc  prefader
    dc  bypass
    dc  hp_scale_hpleft
    dc  hp_fc_hpleft
    dc  hp_qc_hpleft
```

```
        dc  lp_scale_lpleft
        dc  lp_a2_lpleft
        dc  lp_a1_lpleft
        dc  hdcdbp
        dc  gainscalebp
        dc  ddxcompbp
        dc  peq_gamma_6L
        dc  peq_beta_6L
        dc  peq_k_6L
        dc  peq_gamma_7L
        dc  peq_beta_7L
        dc  peq_k_7L
        dc  analogin
        dc  avolume
        dc  bypassmask
        dc  delayval
        dc  ap_gamma_apleft
        dc  ap_beta_apleft
        dc  lp_scale_lpleft2
        dc  lp_a2_lpleft2
        dc  lp_a1_lpleft2
;       dc  lp_b2_lpleft2
;       dc  lp_b1_lpleft2
        dc  peq_gamma_NT1L
        dc  peq_beta_NT1L
        dc  peq_k_NT1L
        dc  peq_gamma_NT2L
        dc  peq_beta_NT2L
        dc  peq_k_NT2L
        dc  peq_gamma_NT3L
        dc  peq_beta_NT3L
        dc  peq_k_NT3L
        dc  YNADA
        dc  YNADA
        dc  YNADA


            ENDSEC


            end
```

```
SH_SCALE_FACTOR EQU 3
SH_SCALE_DIVIDE EQU (1<<SH_SCALE_FACTOR)

;
;   k is gain
;       k = 0       => lo/hi pass filter
;       0 < k < 1   => cut
;       k = 1       => pass-thru
;       k > 1       => boost
;
;   gamma drives critical frequency
;
;

DECLARE_LSH MACRO       name,k,gamma

    org xi:
sh_x_\name          dc  0           ; x(n-1)
sh_y_\name          dc  0           ; y(n-1)

    org yi:
sh_gamma_\name      dc  gamma
sh_minus_one_\name  dc  -1.0
sh_k_\name          dc  k/SH_SCALE_DIVIDE
sh_1_\name          dc  1./SH_SCALE_DIVIDE

    ENDM

DECLARE_HSH MACRO       name,k,gamma

    DECLARE_LSH name,k,gamma

    ENDM

COPY_SH_PARAM   MACRO       from,to

    move    y:sh_gamma_\from,x0
    move    x0,y:sh_gamma_\to
    move    y:sh_k_\from,x0
    move    x0,y:sh_k_\to

    ENDM

INIT_SH_PARAM   MACRO       name

    move    #>(-1.0),x0
    move    x0,y:sh_minus_one_\name
    move    #>(1./SH_SCALE_DIVIDE),x0
    move    x0,y:sh_k_\name
    move    x0,y:sh_1_\name

    ENDM


;
;       input data is in x0
;       input is scaled by 0.5 to prevent internal clipping in the all-pass
;
;       computes all-pass:
;
;       y(n) = - gamma * x(n) - x(n-1) - gamma * y(n-1) (lo-shelv)
;       y(n) = gamma * x(n) + x(n-1) - gamma * y(n-1) (hi-shelv)
;
;       all-pass output is scaled by gain:
;
;       output = ((1+k)/2) * x(n) + ((1-k)/2) * y(n)
;
;       assumes:
;           m0,m4,m5 = -1
;
;
```

0139

```
LSH MACRO       name

    asr     b               #sh_gamma_\name,r4
    rnd     b               #sh_x_\name,r0
    move                    b,x0            y:(r4)+,y0
    ; compute y(n)
    mpy     -x0,y0,b        x:(r0)+,x1      y:(r4)+,y1
    mac     x1,y1,b         x:(r0)-,x1
    macr    -y0,x1,b        x0,x:(r0)+      y:(r4)+,y0
    ; all-pass output in b, now scale by gain/cut factor
    mpy     x0,y0,b         b,x:(r0)-       b,y1
    mac     -y1,y0,b                        y:(r4)+,y0
    mac     x0,y0,b
    mac     y1,y0,b
    ; now scale output to get real result
    asl     #(SH_SCALE_FACTOR),b,b
    rnd     b

    ENDM

HSH MACRO       name

    asr     b               #sh_gamma_\name,r4
    rnd     b               #sh_x_\name,r0
    move                    b,x0            y:(r4)+,y0
    ; compute y(n)
    mpy     x0,y0,b         x:(r0)+,x1      y:(r4)+,y1
    mac     -x1,y1,b        x:(r0)-,x1
    macr    -y0,x1,b        x0,x:(r0)+      y:(r4)+,y0
    ; all-pass output in b, now scale by gain/cut factor
    mpy     x0,y0,b         b,x:(r0)-       b,y1
    mac     -y1,y0,b                        y:(r4)+,y0
    mac     x0,y0,b
    mac     y1,y0,b
    ; now scale output to get real result
    asl     #(SH_SCALE_FACTOR),b,b
    rnd     b

    ENDM
```

0140

```
PEQ_SCALE_FACTOR    EQU 3
PEQ_SCALE_DIVIDE    EQU (1<<PEQ_SCALE_FACTOR)

;
;   k is gain
;       k = 0       => notch filter
;       0 < k < 1   => cut
;       k = 1       => pass-thru
;       k > 1       => boost
;
;   gamma drives critical frequency
;
;   beta defines Q
;

DECLARE_PEQ MACRO       name,k,gamma,beta

    org xi:
peq_y_\name         dc  0
                    dc  0
peq_x_\name         dc  0
                    dc  0

    org yi:
peq_gamma_\name     dc  gamma
peq_beta_\name      dc  beta
peq_k_\name         dc  k/PEQ_SCALE_DIVIDE
peq_1_\name         dc  1./PEQ_SCALE_DIVIDE
peq_v_\name         dc  0
peq_w_\name         dc  0

    ENDM

COPY_PEQ_PARAM  MACRO       from,to

    move    y:peq_gamma_\from,x0
    move    x0,y:peq_gamma_\to
    move    y:peq_beta_\from,x0
    move    x0,y:peq_beta_\to
    move    y:peq_k_\from,x0
    move    x0,y:peq_k_\to

    ENDM

INIT_PEQ_PARAM  MACRO       name

    move    #>(1./PEQ_SCALE_DIVIDE),x0
    move    x0,y:peq_k_\name
    move    x0,y:peq_1_\name

    ENDM

;
;       input data is in b
;       input is scaled by 0.5 to prevent internal clipping in the all-pass
;
;       computes all-pass:
;
;       v(n) = gamma * y(n-1) + y(n-2) - gamma * v(n-1)
;       w(n) = gamma * x(n-1) + x(n-2) - gamma * w(n-1)
;       y(n) = w(n) + beta * x(n) - beta * v(n)
;
;       all-pass output is scaled by gain:
;
;       output = ((1+k)/2) * x(n) + ((1-k)/2) * y(n)
;
;       assumes:
;           m0,m4,m5 = -1
;
;
```

0141

```
PEQ MACRO       name [redacted]

    asr     b       #peq_y_\name,r0
    move            #peq_gamma_\name,r4
    move            #peq_v_\name,r5
    move                    b,x0
    move                    x:(r0)+,a       y:(r4)+,y0
    move                    x:(r0)+,x1      y:(r5)+,y1
    ; compute v(n)
    mac     x1,y0,a         x:(r0)+,b
    mac     -y1,y0,a        x:(r0),x1       y:(r5)-,y1
    ; compute w(n), v(n) is now in a
    mac     x1,y0,b         a,x1            a,y:(r5)+
    mac     -y1,y0,b        x:(r0),a        y:(r4)+,y0
    ; compute y(n), w(n) is now in b
    mac     -x1,y0,b        x0,x:(r0)-      b,y:(r5)-
    mac     x0,y0,b         a,x:(r0)-       y:(r4)+,y0
    ; all-pass output in b, now scale by gain/cut factor
    mpy     x0,y0,b         x:(r0)-,a       b,y1
    mac     -y1,y0,b                        y:(r4)+,y0
    mac     x0,y0,b         a,x:(r0)+
    mac     y1,y0,b         y1,x:(r0)-
    ; now scale output to get real result
    asl     #(PEQ_SCALE_FACTOR),b,b
    rnd     b

    ENDM
```

```
LP_SCALE_FACTOR EQU 6
LP_SCALE_DIVIDE EQU (1<<LP_SCALE_FACTOR)

;
;
;   modified chamberlin lo-pass (both x(n) and x(n-1))
;
;       q also defines gain
;       input is scaled to avoid internal clipping
;
;   f = 2*sin(w/2)  f only valid when less than 1.
;
;   0 < q < 1
;
;   implemented as a direct form biquad with coefficients and data scaled.
;   needs headroom for gain
;

DECLARE_LP  MACRO       name,ca1,ca2,cb

    org xi:
lp_w_\name          ds  2

    org yi:
lp_scale_\name      dc  cb/16.
lp_a2_\name         dc  ca2/2.
lp_a1_\name         dc  ca1/2.
lp_b2_\name         dc  0.0
lp_b1_\name         dc  1.0/2.

    ENDM


COPY_LP_PARAM   MACRO       from,to

    move    y:lp_scale_\from,x0
    move    x0,y:lp_scale_\to
    move    y:lp_a2_\from,x0
    move    x0,y:lp_a2_\to
    move    y:lp_a1_\from,x0
    move    x0,y:lp_a1_\to
    move    y:lp_b2_\from,x0
    move    x0,y:lp_b2_\to
    move    y:lp_b1_\from,x0
    move    x0,y:lp_b1_\to

    ENDM

INIT_LP_PARAM   MACRO       name

    move    #0,x0
    move    x0,y:lp_b2_\name
    move    x0,y:lp_a2_\name
    move    x0,y:lp_a1_\name
    move    x0,y:lp_b1_\name
    move    #>(1./16.),x0
    move    x0,y:lp_scale_\name

    ENDM

INIT_LP2_PARAM  MACRO       name

    move    #0,x0
    move    x0,y:lp_a2_\name
    move    x0,y:lp_a1_\name
    move    #>0.5,x0
    move    x0,y:lp_b2_\name
    move    #>1.,x0
    move    x0,y:lp_b1_\name
```

0143

```
        move    #>(0.25/1[redacted]x0
        move    x0,y:lp_scale_\name

        ENDM


;
;       assumes:
;           m0,m4,m5 = -1
;
;

LP  MACRO       name

        move    b,x0
        ori     #8,mr
        move    #lp_scale_\name,r4
        move    #lp_w_\name,r0
        move
        mpy     x0,y0,b     x:(r0)+,x0      y:(r4)+,y0      ; x0 = x(n), y0 = 0.5
        mac     -x0,y0,b    x:(r0)-,x1      y:(r4)+,y0      ; x0 = w(n-2), y0 = a2
        macr    -x1,y0,b    x1,x:(r0)+      y:(r4)+,y0      ; x1 = W(n-1), y0 = a1
        mac     x0,y0,b     b,x:(r0)-       y:(r4)+,y0      ; w(n-2) = w(n-1), y0 = b2
        macr    x1,y0,b                     y:(r4)+,y0      ; w(n-1) = a, y0 = b1
        andi    #$F7,mr
        asl     #4,b,b

        ENDM
```

```
HP_SCALE_FACTOR EQU 6
HP_SCALE_DIVIDE EQU (1<<HP_SCALE_FACTOR)

;
;
;   chamberlin hi-pass (from lopass)
;
;       q also defines gain
;       input is scaled to avoid internal clipping
;
;   f = 2*sin(w/2)  f only valid when less than 1.
;
;   0 < q < 1
;
;   implemented as a direct form biquad with coefficients and data scaled.
;   needs headroom for gain
;

DECLARE_HP  MACRO       name,fc,qc,scale

    org xi:
hp_s2_\name         ds  1
hp_y_\name          ds  1

    org yi:
hp_scale_\name      dc  (-0.5*scale)
hp_fc_\name         dc  fc
hp_qc_\name         dc  qc

    ENDM


COPY_HP_PARAM   MACRO       from,to

    move    y:hp_scale_\from,x0
    move    x0,y:hp_scale_\to
    move    y:hp_fc_\from,x0
    move    x0,y:hp_fc_\to
    move    y:hp_qc_\from,x0
    move    x0,y:hp_qc_\to


    ENDM


;
;       assumes:
;           m0,m4,m5 = -1
;
;

HP  MACRO       name

    move    #hp_scale_\name,r4
    move    #hp_s2_\name,r0
    move                    b,x0
    ; a = x(n) * scale
    mpy     -y0,x0,a        x:(r0)+,x1      y:(r4)+,y0      ; y0 = scale
    ; b = s2(n-1) * fc
    mpyr    x1,y0,b         x:(r0),x0       y:(r4)+,y1      ; y1 = qc
    ; b = s2(n-1) * fc + y(n-1)
    add     x0,b
    ; a = x(n) - s2(n-1) * fc - y(n-1)
    sub     b,a             b,x:(r0)
    ; a = s1(n) = x(n) - s2(n-1) * fc - y(n-1) - qc * s2(n-1)
    macr    -x1,y1,a        x1,b
    move                    a,x0
    ; b = s2(n) = s2(n-1) + fc * s1(n)
    macr    x0,y0,b         x:(r0)-,x0
```

```
IF  @DEF('LO')
tfr     x0,b        b,x:(r0)
ELSE
tfr     a,b         b,x:(r0)
ENDIF
asl     b

ENDM
```

```
AP_SCALE_FACTOR EQU 3
AP_SCALE_DIVIDE EQU (1<<AP_SCALE_FACTOR)

;
;   gamma drives critical frequency
;
;   beta defines Q
;

DECLARE_AP  MACRO       name,gamma,beta

    org xi:
ap_y_\name          dc  0
                    dc  0
ap_x_\name          dc  0
                    dc  0

    org yi:
ap_gamma_\name      dc  gamma
ap_beta_\name       dc  beta
ap_v_\name          dc  0
ap_w_\name          dc  0

    ENDM

COPY_AP_PARAM   MACRO       from,to

    move    y:ap_gamma_\from,x0
    move    x0,y:ap_gamma_\to
    move    y:ap_beta_\from,x0
    move    x0,y:ap_beta_\to

    ENDM

INIT_AP_PARAM   MACRO       name

    ENDM

;
;       input data is in b
;       input is scaled by 0.5 to prevent internal clipping in the all-pass
;
;       computes all-pass:
;
;       v(n) = gamma * y(n-1) + y(n-2) - gamma * v(n-1)
;       w(n) = gamma * x(n-1) + x(n-2) - gamma * w(n-1)
;       y(n) = w(n) + beta * x(n) - beta * v(n)
;
;       assumes:
;           m0,m4,m5 = -1
;
;

AP  MACRO       name

    asr     b       #ap_y_\name,r0
    move            #ap_gamma_\name,r4
    move            #ap_v_\name,r5
    move                    b,x0
    move                    x:(r0)+,a       y:(r4)+,y0
    move                    x:(r0)+,x1      y:(r5)+,y1
    ; compute v(n)
    mac     x1,y0,a         x:(r0)+,b
    mac     -y1,y0,a        x:(r0),x1       y:(r5)-,y1
    ; compute w(n), v(n) is now in a
    mac     x1,y0,b         a,x1            a,y:(r5)+
    mac     -y1,y0,b        x:(r0),a        y:(r4)+,y0
    ; compute y(n), w(n) is now in b
    mac     -x1,y0,b        x0,x:(r0)-      b,y:(r5)-
    mac     x0,y0,b         a,x:(r0)-
```


0147

```
asl     b
rnd     b
move                    x:(r0)-,a       b,y1
                        a,x:(r0)+
                        y1,x:(r0)-

ENDM
```

include